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LITTLE BLUE PREHISTORY: ARCHAEOLOGICAL INVESTIGATIONS AT BLUE SPRINGS AND LONGVIEW LAKES, JACKSON COUNTY, MISSOURI

A CULTURAL RESOURCE MANAGEMENT PROJECT CONDUCTED FOR THE U.S. ARMY CORPS OF ENGINEERS, KANSAS CITY DISTRICT

VOLUME 1

SUBMITTED IN FULFILLMENT OF CONTRACT DACW41-79-C-0006

Prepared by Soil Systems, Inc.

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1989

Funds for this investigation and report were provided by the U.S. Army Corps of Engineers. The Corps may not necessarily agree with the contents of this report in its entirety. The report reflects the professional views of the Contractor who is responsible for collection of the data, analysis, conclusions, recommendations, and report preparation.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION: unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT: Approved for public release; distribution is unlimited
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION: Soil Systems, Inc. — 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code)	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING / SPONSORING ORGANIZATION: Kansas City US Army Engineering District — 8b. OFFICE SYMBOL (If applicable): CEMRKPD-R	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER: DACW41-79-C-0006
8c. ADDRESS (City, State, and ZIP Code): 700 Federal Bldg. 601 East 12th Street, Kansas City, Missouri 64106-2896	10. SOURCE OF FUNDING NUMBERS: PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
Little Blue Prehistory: Archeological Investigations at Blue Springs and Longview Lakes, Jackson County, Missouri Volumes 1,2

12. PERSONAL AUTHOR(S)
Larry Schmits

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final	FROM 1979 TO 1982	1989	596

16. SUPPLEMENTARY NOTATION

17. COSATI CODES		
FIELD	GROUP	SUB-GROUP

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
archeology, Jackson County, Mo., data recovery, geology, Little Blue River, biotic resources

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

An archeological investigation studied 34 sites located on lands designated for the construction of the Longview and Blue Springs Lakes, on the Little Blue River, in Jackson County, Missouri. The study was a combined National Register testing and data recovery mitigation program. The findings of the archeology provided insight into prehistoric occupation of the Kansas City area.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT: ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION: unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL: PD, Environmental Resources Branch	22b. TELEPHONE (Include Area Code): (816) 426-3402 — 22c. OFFICE SYMBOL: CEMRKPD-R

DD Form 1473, JUN 86 — Previous editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

UNCLASSIFIED

ACKNOWLEDGEMENTS

The Editor acknowledges with pleasure the efforts of a number of individuals, institutions and private firms which make the completion of this study possible. Foremost among these is the U.S. Army Corps of Engineers, Kansas City District. Michael S. Weichman of The Historic Preservation Program, Missouri Department of Natural Resources offered helpful suggestions concerning research problems and field methodology for the project. Ken Brown and Kenneth Reid provided assistance in the development of the research design for the project. Barry D. Greenhouse, Pat Garrow, and Bud Northcutt of SSI provided administrative assistance with the project. Curt Sorenson provided assistance with field interpretations of the profiles at a number of the sites. Linda Brown and Elaine Powell spent many days typing many drafts of the report. Additionally, Linda Brown served as administrative assistant for the project. Tom Reust assisted in the supervised cataloging and processing of the collection. Field and laboratory staff included Patricia McCoy, Patricia Mercado, Marsha Gonzalez, Tom Dureka, Leonard Bates, Jill Graham, Ted England, Charles Traylor, Bert Herbert, Francine Blume, Cathy Kennedy, Barbara Campbell, Roger Saft, Philip Fox, John Eads, John Parisi, David Aubrey, Marcia Gandy, Charles Green, Chad Haywood, John Markel, Tonya Neil, Barry Shelley, Carmel Swidler, Richard Warner and Bill Cukar. Bruce Bailey assisted with the editing of the intial report and Bill Lees with the final draft. Marty Robison made many of the final revisions, and Katie Parker and Sarah Nutty assisted in final editing. Finally, we would like to thank John Wait and his staff at Encore Copy Corps for their extra efforts in processing all these words under a lot of editorial pressure.

ABSTRACT

Impoundment by the U.S. Army Corps of Engineers of Blue Springs and Longview Lakes in Jackson County, Missouri will impact significant cultural resources. The Kansas City District of the Corps of Engineers began a program of cultural resource inventory and evaluation in the early 1970's for the affected areas. This program culminated in a large archeological excavation project involving study of 34 sites to determine National Register eligibility, to develop a mitigation plan, and to provide for data recovery.

This report discusses the findings of the study project. Archeological remains included sites dating from the Early Archaic to Mississippian periods, with most data pertaining to the Late Archaic, Middle Woodland, and Late Mississippian periods. The geological and environmental history of the study area is also discussed, with particular reference to factors important to prehistoric groups. A final chapter of the report summarizes knowledge gained from the study program.

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CHAPTER I

INTRODUCTION AND BACKGROUND OF THE PROJECT

Larry J. Schmits

Impoundment by the U.S. Army Corps of Engineers of the Blue Springs and Longview Lakes (Fig. 1) in Jackson County, Missouri will impact significant cultural and paleoecological resources. The importance of these areas, in terms of understanding local prehistory, can be viewed with the following perspectives.

In the Kansas City region the years between 1940 and 1970 have largely been devoted to the documentation of the Kansas City Hopewell complex (A.D.1-500) in Platte and Clay Counties, Missouri, on the east bank of the Missouri River immediately north of Kansas City, Missouri. Data from these investigations have been collected by various institutions including the U.S. National Museum (Wedel 1943); the Kansas City Chapter of the Missouri Archaeological Society, the Kansas City Museum of History and Science and the University of Missouri (Roedl and Howard 1957); the Missouri Archaeological Society and the University of Missouri (Shippee 1967). The University of Kansas, Museum of Anthropology began intensive field projects in 1963 and was later joined by teams from Kansas State University. The results of these projects were incorporated by Johnson (1976) in "Hopewellian Archaeology in the Lower Missouri Valley." More recently the Late Archaic period has been investigated in the Kansas City locality (Reid 1978, 1980a and 1980b). The Mississippian period occupations, ca A.D.760-1290 have been investigated by Shippee (1972) and O'Brien (1978). Site survey data are available for the Late Woodland (A.D. 500-700) from Brush Creek Valley (Johnson 1974).

Since the mid-1970's an effort equal to that given to the North Kansas City locality has been afforded to Jackson County, Missouri. This area is just south of the Missouri River opposite Platte and Clay counties. Little Blue River drainage modifications and highway projects have made available funds for survey, testing, and mitigation study of cultural resources on a scale which has complemented the data base from north of the river and which refines our understanding of prehistory for the entire Kansas City area.

In 1973 the Museum of Anthropology at the University of Kansas under contract with the U.S. Army Corps of Engineers began investigation of the Little Blue River drainage with Heffner's (1974) assessment of the archaeological resources for the middle reaches of the drainage. Reid (1975) reported on both prehistoric and historic resources for the same area. Selected prehistoric sites were investigated by way of test excavations in that area (Heffner and Martin 1976). In 1976 Brown and Baumler presented an archaeological research design for proposed modifications of the Little Blue River channel. Later, Brown (1977) conducted additional survey and test investigations in the

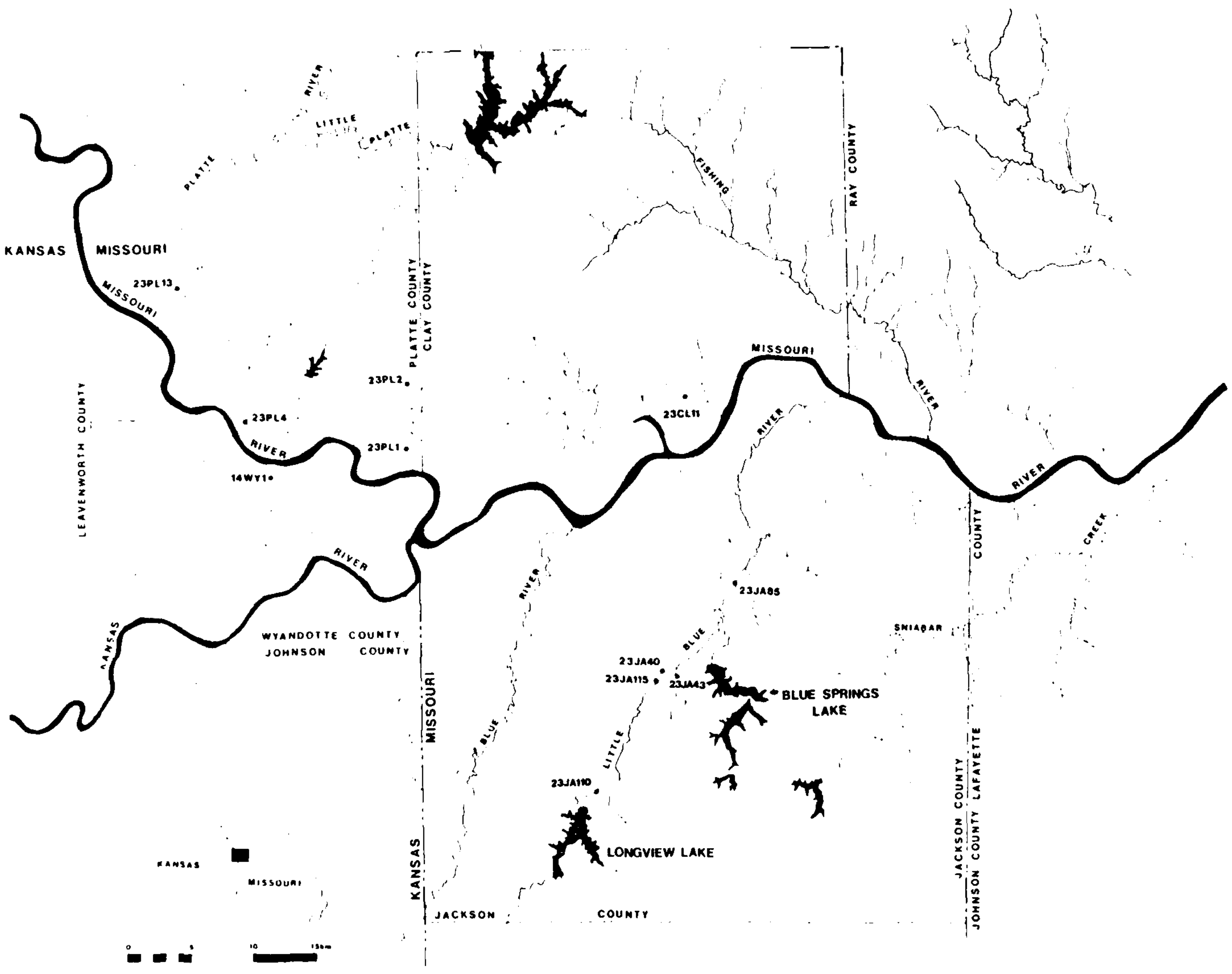

Figure 1. Location of Blue Springs and Longview Lakes and well known, previously studied sites in the region which are mentioned in various places in the text.

proposed Blue Springs and Longview Lakes area. This report included a series of recommendations for managing cultural resources which would be affected by construction of the lakes and by sewer interceptor projects proposed and conducted by the Little Blue Valley Sewer District. For the later project, testing and salvage investigations were performed in both lake areas (Wright 1978, 1979, 1980). At about the same time, Brown and Ziegler (1979) conducted test and salvage excavations in areas within the Little Blue River channel modification right-of-way north and west of the proposed Blue Springs Lakes for the Corps of Engineers. In 1976, the Missouri State Highway Commission and Federal Highway Administration, in cooperation with the University of Missouri, tested and excavated archaeological sites within the construction right-of-way of the proposed I-470 highway project near the continuence of Cedar Creek and the Little Blue River in southern Jackson County (Reeder 1977, 1978).

An archaeological and historical survey of the proposed May Brook sewage interceptor line area was conducted by the Kansas City Museum of History and Science and Larkin and Associates Consulting Engineers near Lee's Summit (Feagins 1976). Construction activities in 1979 resulted in the exposure of a previously unknown buried component at site 23JA43. Excavation and study of the site was performed by Soil Systems, Inc. (Schmits 1980).

The present project, referred to as the Little Blue Lakes Project, involved the excavation and study of five archaeological sites and further testing of 29 sites to determine their potential significance. The sites chosen for testing and excavation were based on recommendations from previous survey and testing conducted by the University of Kansas (Brown 1977). These investigations included archaeological, historical, and architectural inventories. As a result, both the Longview and Blue Springs areas were determined to be eligible for National Register status as Archaeological Districts. The present work was called for in the National Historic Preservation Act of 1966 (P.L. 89-665) as amended by Public Law 93-291 and was performed in accordance with 36 CFR 800. The investigations provide documentation evidencing compliance with Executive Order 11593 "Protection and Enhancement of the Cultural Environment." The previous survey, inventory, and assessment work (especially Brown 1977), was considered Phase I study. Phase II test excavations had been initiated by Brown but were incomplete. No Phase III data recovery (large scale excavation) had been accomplished. (Division of archaeological work into Phases I, II, and III follows guidelines issued by the Missouri Historic Preservation Program.)

The scope of work for the project (Appendix 1) called for determining the settlement-subsistence patterns and the season of occupation of sites, investigation of lithic raw material resource utilization, and ancillary geological, botanical, and zoological studies which will provide a framework to view successive human adaptations to the environment of the area. In fullfillment of these goals, this report includes cultural and ecological backgrounds for the project areas including archaeological and paleological overviews in Chapters II and III. The Research Design, which outlines research problems, strategies, and methods for documenting and explaining culture change in the Little Blue Lakes area, is presented in Chapter IV. Ecological background data, including the geology and biotic resources present in the area, are presented in Chapters V and VI.

The Phase II test excavations are presented in three separate chapters. Chapter VII describes the results of test excavations at 23JA109. Test investigations at two sites tested in lieu of extensive data recovery are presented in Chapters VIII and IX. The Cold Clay site (23JA155) contained a deeply buried Archaic component. The Black Belly site (23JA238) contained two vertically stratified components, Middle Woodland and Mississippian period May Brook phase (Schmits 1980). Since the buried Archaic sites are poorly known for the Kansas City locality and the May Brook Phase has only been recently defined, these two sites are of considerable interest to the research problems posed by the study. Therefore, they have been afforded extended analyses in Chapters VIII and IX. The results of extensive data recovery investigations are presented for five sites: the Bowlin Bridge site, 23JA38 (Chapter X); the Mouse Creek site, 23JA104 (Chapter XI); 23JA112 (Chapter XII); 22JA170 (Chapter XIII); and the Turner-Casey site, 23JA35 (Chapter XIV).

In Chapter XV, "Cultural Adaptation in the Little Blue River Valley," we evaluate the results of these investigations against previous understanding of the area's prehistory and the research problems presented in the research design. In this chapter data for the general Kansas City locality are integrated with the present data from the Little Blue drainage in an effort to update knowledge of the cultural-historical sequence and of settlement-subsistence patterns. A popular account of the project written in non-technical terms is available to the lay and non-professional reader.

CHAPTER II

HOLOCENE CLIMATES IN THE PLAINS AND MIDWEST

Larry J. Schmits

A considerable body of paleoecological data has accumulated during the past few decades from which Holocene climatic variations can be inferred. These data consist of pollen and plant macro-fossil sequences, evidence of glacial terminal fluctuations and stratigraphic evidence. The majority of the pollen sequences that have been sampled are located in northeastern North America, New England, the Great Lakes and the surrounding areas of the Midwest. Over 60 radiocarbon dated pollen sequences are available in these areas alone. Because of the wealth of data available, discussion of pollen evidence relies most heavily on summaries by Bernabo and Webb (1977) and Wright (1977), along with more detailed discussions of Plains sites and recently published sequences not included in their summaries.

According to Wright (1977:15), the Pleistocene-Holocene boundary is marked by the time-transgressive disappearance of the spruce forest from the Plains area beginning at 15,000 B.P. and extending to approximately 10,000 B.P. The replacement of spruce ranges from 12,000 B.P. in the present prairies to 10,000 B.P. in the northern conifer forest area. Trees that replaced the spruce forest may have depended more on seed sources and on other factors such as soil conditions rather than climate. Based on Wright's (1977) work, the early Holocene warming trend, referred to as the Hypsithermal, is most easily followed at the prairie border in Minnesota. When the climate became too warm for regeneration of spruce, the coniferous forest was replaced by alder and birch. An elm and oak forest containing ironwood, maple, ash and basswood soon followed. Pollen curves for herbaceous plants associated with prairie increased. The transformation to prairie was completed in Nebraska and Kansas by 10,000 B.P. with only a brief interval of deciduous woodland. In Minnesota, the transformation was not completed until about 7000 B.P. when prairie and oak extended 100 km east of its present limits. Pine reached eastern Minnesota at 10,000 B.P. The early Holocene increase in temperature brought about a replacement of jack pine by temperate hardwoods. Elm became a more significant component of this forest than it is today. White pine migrated westward, reaching eastern Minnesota at 7000 B.P. during the height of the prairie period. The prairie period temporarily halted the westward migration of white pine. White pine and other conifers are still expanding into the hardwood forest.

Bernabo and Webb (1977) used isopol, difference and isochrone maps to illustrate changing Holocene distributions of five major pollen groups: spruce, pine, oak, herbs and a group referred to as BAFT. The herb group consists of non-aboreal pollen types characteristic of temperate grasslands. The BAFT group includes the genera Betula, Acer, Fagus, and Tsuga (birch, maple, beech and hemlock). These groups dominate the Holocene sequence, and their modern distributions show clear patterns on maps. The data presented by Bernabo and Webb indicate that the largest changes occurred in the early Holocene between 11,000 and 7000 B.P. By 7000 B.P., essentially modern geographical configurations of the North American vegetation formations were established, although minor changes continued to occur.

Major trends on the maps indicate the northward retreat of the late-glacial boreal forest, the movement of the deciduous forest/coniferous-hardwood forest ecotone, the movement of the prairie/deciduous forest ecotone and the expansion in range and abundance of birch, maple, beech and hemlock. The decline in spruce occurred predominantly between 11,000 and 8000 B.P. The retreat of the southern boreal forest limit exceeded the rate of deglaciation from 11,000 to 9000 B.P. and the compression of this forest zone left only a thin belt of spruce forest in close proximity to the retreating ice. The northward movement of spruce slowed after 9000 B.P. and reached its northernmost limit sometime after 6000 B.P. (Bryson, et al 1969). The pollen data indicate that the decline of the spruce forest was a stepwise series of events. Between 4000 and 2000 B.P., the spruce pollen increased in the Great Lakes area marking a southward re-expansion of the boreal forest. In the Northeast Territories of Canada several late Holocene advances and retreats of the forest/tundra border are recorded by Sorenson (1977).

The distribution of pine was confined to areas east of a line from Lake Michigan to North Carolina before 11,000 B.P. As the values of spruce pollen declined, pine trees migrated rapidly westward and, by 10,000 B.P., occupied the southern Great Lakes region continuing northward as spruce declined. As pine continued northward, it was replaced in the south by oak. Early in the Holocene the conifer-hardwood/deciduous forest ecotone shifted rapidly northward in direct response to the fast changing climate. After 8000 B.P., the movement of this ecotone slowed and its position moved only slightly farther north. After 4000 B.P., the prairie/forest ecotone shifted westward as the prairie receded.

The expansion of birch, maple, beech and hemlock (BAFT pollen group) occurred differentially in New England and the Great Lakes region. In New England, the group became prominent shortly after hemlock and beech arrived. In the Great Lakes region, the expansion of these genera occurred after 7000 B.P. This expansion coincides with the westward retreat of the prairie in apparent association with cooler and wetter post-Hypsithermal conditions in the Midwest, which would have decreased frequencies of fires and created more favorable conditions for these trees.

Evidence of prairie development occurs at least as early as 11,000 B.P., as the boreal forest began to retreat. Herb pollen in eastern South Dakota and Kansas began to rise as deciduous forest pollen replaced spruce pollen. The largest eastward shift of the prairie took place between 10,000 and 9000 B.P. By 9000 B.P., prairie extended over the same area of the Midwest as it did prior to settlement. The prairie border remained stable from 9000 B.P. until 8000-7000 B.P., when the prairie expanded, reaching its maximum eastward limit. From 7000 to 2000 B.P., the prairie/forest border receded westward, but at a slower pace than it had expanded eastward earlier in the Holocene.

While the previously discussed pollen data provide information about the nature of regional vegetation, plant macrofossils yield more information about local environmental conditions. The pollen sequence from Kirchner Marsh in southeastern Minnesota (Wright, Winter, and Patten 1963) indicates that the prairie advance began in Zone C-a (9300-7100 B.P.) and that the oak re-advance was not complete until midway through Zone C-c (5100 B.P. - present). Zone C-b (7000-5000 B.P.) delimits the most severe period of aridity and eastward advance in Minnesota. Analysis of the seeds from Kirchner Marsh (Watts and Winter 1966) indicates deep water conditions by the middle of the zone. The seed assemblage in Zone C-b (7000-5000 B.P.) indicates invasion of the lake by annual plants. The persistence of annuals over a long period of time and lack of corroded pollen grains indicate that recurrent summer droughts, rather than overall reduced precipitation, caused the peaks in annuals over a long period of time and lack of corroded pollen grains indicate that recurrent summer droughts, rather than overall reduced precipitation, caused the peaks in annuals. Four major droughts are inferred for Zone C-b. The first drought at the base of the zone is followed by a long period of macrofossil accumulation, suggesting shallow water environments. In the upper part of the zone, three drought intervals alternate with intervals containing deep-water macroflora. Based on uniform sedimentation rates, drought periods probably lasted 200 years. Data from other sites in Minnesota discussed by Watts and Winter corroborate this interpretation and provide evidence of the regional extent of these drought intervals.

A similar record was obtained by Watts and Bright (1968) from Pickerel Lake where similar lake level fluctuations occur in Zone 3 (9400-3000 B.P.). Wet ground seeds, referred to as "draw down" plants, periodically appear in the profile. According to Watts and Bright, fluctuations at both Pickerel Lake and Kirchner Marsh are consistent with a climate similar to the present, but with more erratic rainfall distribution resulting from frequent and severe summer droughts.

The pollen data has been converted directly to diagrams of climatic parameters by numerical transfer functions based on the relation of modern pollen rain to modern vegetation and climate. Webb and Bryson (1972) used canonical correlation analysis to provide a reconstruction of quantitative time series of past climatic variables for three sites during the last 15,000 years. They used pollen sections from Kirchner Marsh in southeast Minnesota, Disterhaft Farm Bog in southeast Wisconsin and Lake Mary in northern Wisconsin.

According to Webb and Bryson (1972:99-100), two major climatic events are apparent in the time series. The first is the distinctive change from the late glacial climate to that of the Holocene at 11,300 B.P. Reconstructed late glacial climates at Disterhaft Farm Bog and Kirchner Marsh are similar with colder, cloudier and moister conditions prevailing at both sites. The nature of the air masses was quite different from today with four months of southerly flow during the warm season. July mean temperature was about 4.4^{o} C. below the present mean, probably resulting from a dominance of Arctic air during the summer and shorter duration of maritime tropical air in the region during summer and fall. Combinations of frequent Arctic air in July and a summer southerly flow pattern imply the meeting of contrasting air masses in the region. Cloudy, rainy conditions associated with frontal zones are consistent with this picture.

During the transition to the Holocene, Pacific-south became the prevailing air masses during winter and the increase in July mean temperature was marked. The amount of cloudiness declined with the rise in dry westerly air and snowfall decreased. Climates at Kirchner Marsh and Disterhaft Farm averaged 3.3^{o} C. warmer in July than before. The amount of rain during the growing season remained unchanged. Winters became less snowy and cloudy. By 9500 B.P., the flow of Pacific air increased at Lake Mary and Kirchner Marsh and the July mean temperature increased by 1.1^{o} C. At the same time, moisture stress and isolines showing the duration of Pacific air steepened from west to east. At 7200 B.P., the flow of Pacific air decreased and the maritime tropical air increased at Lake Mary. Opposite conditions occurred at Kirchner Marsh where an increase in herb pollen indicated the beginning of the prairie interval. Less precipitation fell during the growing season, and the Pacific air persisted longer, probably into the spring. The gradient in rainfall and moisture stress that developed earlier between Wisconsin and east Minnesota steepened. Pollen data at Kirchner Marsh indicates a period of maximum dryness.

The reconstructed climatic time series from Kirchner Marsh indicates changes in climate at about 5500 and later at 4700 B.P. The changes consist of a decrease in the duration of Pacific air and a rise in Arctic and southerly flow. Oak pollen increased to replace dominance by herb pollen during the first change and herbaceous pollen decreased during the second. The east-west maritime gradient between the Minnesota sites and the Wisconsin sites was greatly reduced by these changes. Further changes registered at the three sites include an increase in duration of westerly air by one month at 3800 B.P. at Lake Mary. The time series for Kirchner Marsh shows a rise in duration of Arctic air and a decrease in maritime Tropical air after 2000 B.P. Temperature and moisture stress also decrease. These changes result in values in climatic variables that indicate conditions more like those of about 10,000 B.P. than the intervening episode.

Another important source of information on Holocene climatic variations is fluctuations of small alpine glaciers. Based on glacial terminal fluctuation, Denton and Karlen (1973) have defined three broad intervals of world-

wide glacial expansion in the past 7000 years. The oldest dates to 5800-4900 B.P. and the second from 3300-2400 B.P. The most recent, often referred to as the Little Ice Age, occurred from 475-55 years B.P. The most intense cold phases during these periods peaked at 5300, 2800 and 350-200 B.P. During these intervals most glaciers expanded 10-25 percent beyond their present length. The expansion at 5800-4900 B.P. was less extensive than subsequent advances. Warm intervals occurred between these periods at 5975-6175, 4030-3300, 3400-1250, 1050-460, and 50-0 B.P., resulting in glacial contraction and rises in the spruce tree line in alpine areas.

Denton and Karlen view glacial activity as controlled primarily by mean summer temperature. Mean summer temperature variations of up to 3.5° C. can be inferred over the last two broad periods of glacial expansion and contraction. They emphasize that the glacial record documents high frequency Holocene climatic fluctuations which were probably superimposed on general late Holocene cooling recognized in the pollen profiles and deep sea cores. They note that intervals of expansion consist of 600-900 years in duration separated by larger intervals of contraction up to 1700 years in duration. They postulate that the periods of expansion recur in a consistent pattern with the coldest peaks spaced approximately 2500 years apart. They feel that the best explanation for these cold intervals is variation in atmospheric C^{14} activity resulting from varying corpuscular emission from the sun.

Benedict (1973, 1981) provides additional data concerning Holocene glacial terminal fluctuations in the Colorado Front Range. Intervals of ice expansion in Front Range cirques include the following advance: Triple Lakes (5000-3000 B.P.), Audubon (1850-950 B.P.) and Arapaho Peak (300-100 B.P.). Additionally, two advances occurred in the region prior to the Hypsithermal. These include the Santanta Peak advance which began 12,000-11,000 B.P. and ended prior to 9,200 B.P., and a minor advance which occurred between 7250 and 6600 B.P. Benedict attributes these moraine fluctuations to changes in regional climate rather than local non-climatic factors. Since the front range sequence is somewhat out of phase with the world wide sequence proposed by Denton and Karlen, it may be a better reflection of regional climatic conditions to the east in the Plains than the world wide sequence proposed by Denton and Karlen.

Geological and pedological evidence such as sedimentological data, evidence of soil formation and changes in alluvial sequences also provide evidence concerning Holocene environments in the Plains and Midwest. Walker's (1966) study of four bogs on the Des Moines lobe in northern Iowa shows stratigraphic changes associated with postglacial climatic changes. Early postglacial sediments (Lower Silt) indicate a cool period dating from 13,00-10,500 B.P. The high mineral content and low amounts of pollen indicate a sparse vegetational cover. Deposition of an organic rich unit (Lower Muck) from 10,500-8000 indicates a warming climate. Pollen from this unit indicates that the vegetative cover consisted of hardwood forest species succeeded by boreal species.

A second mineral stratum (Upper Silt) deposited from 8000-3000 B.P. marks a warm dry interval. During this period, much of the soil formed on the uplands during the Lower Muck phase was eroded. Walker suggests that conditions in the uplands favoring soil removal may have been caused by a relatively sudden change in climate resulting in depletion of the vegetative cover. Resumption of the deposition of organic rich sediments (3000 B.P. to the present) referred to as the Upper Muck marks a return to climatic conditions similar to the present.

Knox (1972) has surveyed much of the available literature concerning the alluvial stratigraphy and chronology of the Plains and Midwest and has concluded that the early Holocene in the Plains was a period of widespread valley alluviation. He feels that reduced rates of alluviation and renewed degradation may have followed after 6000 B.P. By 4500 B.P. a period of major channel entrenchment is indicated. Because of limited dating, he was not able to determine precisely whether this entrenchment began during the Hypsithermal (7500-5000 B.P.) or at its close, as the climate became more humid. Erosion or channel stability persisted until about 3500-3000 B.P. Since that time, alluviation has been a dominant process. Knox suggests from the limited available evidence that periods of alluviation occur during dry intervals and that erosion or entrenchment occurs in response to more humid climatic conditions.

Ahler's (1976) study of the T-1 sediments from Rogers Shelter, located in the Pomme de Terre Valley on the western periphery of the Ozark Highlands of Missouri, indicates a period of maximum aggradation with hillside erosion from 9400-8600 B.P. marking decreased precipitation. The period 6300-3000 B.P. is marked by severe local erosion and alluvial fan deposition attributed to a xeric climate. Haynes' (1976) geological work in the area indicates that with the exception of colluvial deposition, such as the alluvial fan deposits at Rodgers, the flood plain of the Pomme de Terre remained essentially stable from 6000 B.P. to approximately 1000 B.P. Shortly before the later date, the T-1 was abandoned and entrenchment of the T-0 began.

At the Koster site in the lower Illinois River valley of southwest Illinois, Butzer (1977) has recorded stabilization of the Illinois River at 10,000-8500 B.P. A climate more continental than the previous is associated with this period. A period of rapid aggradation with a reduced precipitation occurs from 8500 to 7700 B.P. Rapid aggradation is also indicated for the interval 7700-5500 B.P. A more xeric interval from 5500-3000 B.P. resulted in soil stripping on the upper slopes, along with stabilization of the river flood plain at its present level. A more mesic interval (5000-2100 B.P.) followed and was characterized by diminished footslope accretion and development of maximum forest expansion. Later periods of soil stripping and forest decimation at Koster occurred at 2100-1900 B.P. and 1250-950 B.P.

Work at the Coffey site (Schmits 1977,1978) located along the Big Blue River in the Flint Hills of northeast Kansas indicates aggradation of the flood plain of the Big Blue River just prior to 6000 B.P. Stabilization of the flood plain is evident from 5300 B.P. to as late as 2000 B.P. A period of rapid aggradation occurred after 2000 B.P., probably during the first millenium A.D. Sediments at Coffey dating to the Hypsithermal are highly oxidized and have low organic content. Post Hypsithermal sediments are reduced and have higher organic content, indicating more mesic climatic conditions in post Hypsithermal times.

In summary, the transition from the late glacial to the Holocene occurred between 12,000 and 10,000 years B.P. and was marked in the Midwest and Plains by the retreat of the Laurentide ice sheet and the collapse of the boreal spruce forest. Climatic parameters derived from pollen data indicate that the transition from late glacial to the postglacial was associated with a change from dominance of arctic air masses to Pacific air masses during the summer.

A considerable body of evidence indicates numerous climatic changes during the Holocene. In the Midwest, the spruce forest was transformed to prairie with only a brief interval of deciduous woodland. Increasing temperatures and aridity resulted in expansion of the prairie eastward into the prairie peninsula from 8000-7000 B.P. The interval of prairie expansion reached its easternmost extent at 7000 B.P. From 7000-2000 B.P. it gradually retreated westward. The period 8000-5000 B.P. marks the most arid part of the Holocene and has been variously referred to as the Hypsithermal or Altithermal. From 7000 to 2000 B.P. the prairie/deciduous forest border receded westward. Plant macrofossils recovered from Midwest and Plains sites indicate that this period was characterized by recurrent and severe droughts resulting in the lowering of lake levels at pollen sites. The climatic parameters reconstructed by Webb and Bryson from Kirchner Marsh indicate an increase in Pacific air masses at 7280 B.P. Decreases in the duration of Pacific air occurred at 5500 B.P. and again at 4700 B.P.

The intervals of glacial expansion described by Denton and Karlen are largely in agreement with climatic sequences described by Webb and Bryson, with warm intervals occurring at 6170-5975 B.P. and at 4030-3300 B.P. Cooler periods occurred 5800-4900 B.P. and 3300-2400 B.P. The major discrepancy is the glacial advance 5880-4900 B.P. The pollen record for this period indicates the climate was warm and dry. Benedict's Tripple Lake advance on the Colorado Front Range from 5000 to 3000 B.P. shows a better correlation with the Midwest pollen sequence. Stratigraphically, the mid-Holocene warm interval was marked by hillslope erosion in northern Iowa and south central Missouri and by channel entrenchment in the Plains.

The Hypsithermal or Altithermal marked a period of intense warming on the Plains. The prairie wedge moved eastward, advancing primarily over loess-derived soils from the Missouri/Mississippi drainage systems. However, not all regions shared in this perceived unidirectional trend. Butler (n.d.) notes that while the tendency was toward warmer and dryer conditions on the

Plains, the northern Rockies appear to have experienced a minor glacial resurgence. Specifically, he dates a re-advance in the Lembi Mountains of Idaho at approximately 7100 B.P. Similar examples are documented in the Canadian Rockies (Benedict 1981). These studies illustrate the contention that terms such as Altithermal coined by Antevs (1955) once served a purpose but are no longer appropriate (Bryson, Baerreis, and Wendland 1970). On a smaller scale it is probable that dates from a variety of sources within the Plains region point to intraregional inequities in the reconstructed bioclimates. For example, Knox (1972) described widespread valley alluviation in response to a climatic shift toward more humid conditions in southwestern Wisconsin around 6000 B.P., whereas King (1980) cites evidence that the mid-Holocene drought continued until at least 5700 B.P. in Stoddard County, Missouri and until 5100 B.P. in Atchinson County, Kansas.

The end of the Hypsithermal is generally one of increased moisture availability in the central Midwest as the mid-Holocene drought weakened. A moist or at least mesic and non-drought-like episode appears to have been present in north-central Kansas, based on interpretation of dated paleosols from Mitchell and Phillips Counties (Bornowski n.d.; Dort, Sorenson, and Johnson n.d.)

The period 5000-3000 B.P. appears to have been a fairly stable, and probably moist, period on the Plains. Dates that are interpretable in terms of climatic significance are not commonly available for this period except at cultural sites, and the climatic significance of dates from these sites is not always apparent. A date from a hearth that falls within this period is not necessarily an important climatic indicator unless additional interpretive data are available. From what we know of general cultural patterns, the Late Archaic was a relatively moist and mild period on the Plains. The prairie wedge receded westward, and most pollen studies show an increase in arboreal pollen.

A general pattern of muted environmental changes seems to have continued to the present. Beginning around 2300 to 1700 B.P. numerous cultural and alluvial chronologies record several abrupt, but localized environmental shifts. Along the north and south margins of the forest-prairie boundary a series of studies reveal evidence of flood plain aggradation attributable to climatic change (Knox 1972; Reid and Artz n.d.). These trends are not unidirectional nor are they synchronous. Reid and Artz describe 4000 year alluvial chronologies from two sites on opposite sides of the southern cross timbers/prairie boundary as being out of phase at any given time, but when examined through time, they appear to follow a pattern of alluviation followed by a soil forming interval which in turn is replaced by a period of downcutting in the valley trunk streams.

This problem of apparently conflicting localized climatic shifts has been addressed by Baerris, Bryson, and Kutzbach (1976) and in an earlier article by Bryson, Baerris, and Wendland (1970). They account for these effects by postulating shifts in the flow patterns of high altitude westerlies over 100-200 year periods, resulting in various configurations of polar and tropical air

mass contact zones. The western Great Lakes and central Midwest area is hypothesized, based on data from Hells Kitchen, Wisconsin, to have been warmer and drier than present from 1700 to 1250 B.P., then becoming more moist in the period 1250-850 B.P., and then cooler in the period 850-700 B.P. In the Southwest and Northeast this pattern does not hold (Baerris, Bryson, and Kutzbach 1976).

At around 700 B.P. Bryson, Baerris, and Wendland (1970) demonstrate a relatively severe drought in northern Iowa, using pollen data and cultural remains from Mill Creek sites. This drought was probably more severe to the west, and Bryson, Baerris and Wendland (1970) hypothesize that it resulted in depopulation of the Upper Republican River area. Movement of the Upper Republican inhabitants was thought to be south into western Oklahoma, where during this time there was a large increase in summer precipitation (Bryson, Baerris, and Wendland 1970).

The impact of this drought on the Kansas City area is unknown. Bryson, Baerris, and Wendland (1970) present a map showing effective summer rainfall changes for the time; Kansas City falls in the 25 percent decrease area. However, this map is somewhat speculative. Kansas City is midway between the extreme drought area to the north and the Oklahoma high rainfall area. A recent study of a late Holocene pollen sequence in southwestern Kansas (Shumard 1974) shows little dramatic climate shifts over the period 900 B.P. to present, although Shumard interprets the period 900 to 500 B.P. as slightly drier that the period after 500 B.P. This southwestern Kansas locality, however, may be independent of changes in the western Oklahoma locality or the Iowa area.

A drought at about 700 B.P. in the Kansas City area does have some support in that cultural changes apparently took place at that time. At about 700 B.P. (A.D. 1200) Steed-Kisker sites in the north Kansas City area appear to have been abandoned, while May Brook phase sites appear for the first time in the Little Blue Valley.

Baerris, Bryson, and Kutzbach (1976) see a slight amelioration after 550 B.P., culminating in the "Little Ice Age" of A.D. 1750-1850 and a slightly cooler and wetter climate. By this time, however, it is difficult to separate the impact of climate from that of European settlement of North America on native populations.

In summary, region-wide patterns for the period 1700 B.P. to present may mean little locally. There is evidence of climatic change through this period, but these data tend to emphasize differences in patterns in nearby localities, and to obscure regional trends. What is needed is a periodic review of dates attributable to environmental shifts on the order of the study by Bryson, Baerreis, and Wendland (1970). Their study, based on radiocarbon dates through 1968, revealed major episodes of climatic change. Perhaps there are now enough data to do such an analysis regionally in an effort to sort out regional from global trends. A better understanding of regional patterns may perhaps then be achieved.

CHAPTER III

CULTURAL OVERVIEW OF THE LITTLE BLUE VALLEY

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In this section, we present a cultural overview for the Kansas City area and discuss current research problems, hypotheses, and taxonomic formulations. In our presentation we use a period by period approach, with discussion emphases on periods and subperiods strongly represented by data from the Little Blue Lakes project.

Chapman (1975, 1980) has recently reviewed the archaeology of Missouri and summarized data from a variety of survey and excavation reports. Chapman's focus in his two review volumes is on cultural historical problems, with excellent summaries of artifact assemblages and their differences and similarities. Based on various previous works and his own analyses, Chapman presents a cultural historical sequence with periods and subperiods indicative of the variability in technology, settlement organization, and subsistence practices.

We have in general followed Chapman's taxonomy in this report. Chapman's two-volume summary of Missouri archaeology is the most recent comprehensive statement for the region. In addition, Chapman's taxonomy represents well the general relationship of Kansas City area complexes to similar complexes in eastern Missouri and eastern North America in general. Previous researchers in the Kansas City region have used a variety of taxonomic schemes, and, for comparison, several of these are presented along with Chapman's system in Figure 2.

PALEO-INDIAN PERIOD

The Paleo-Indian period (12,000-8,000 B.C.) is poorly known in Missouri, and especially in western Missouri. Chapman (1975:67) presents the results of an informant survey and literature search concerning the distribution of fluted projectile points (Clovis, Folsom) by counties in Missouri. A strong trend is evident, with such points located near the Missouri, the Mississippi, and other rivers, and with a dense concentration near the juncture of the Missouri and the Mississippi Rivers in the St. Louis vicinity. Very few fluted points were recorded for the Lower Missouri Valley Locality. According to Chapman (1975:67), Clay and Lafayette Counties were represented by two points each, and Ray and Jackson Counties by one each. Shippee (1964) describes six fluted points from Clay County and one from Platte County in his summary of Paleo-Indian and Archaic period data for the Kansas City area.

Period	Date
Historic	
	1700
Late Mississippi	
	1450
Middle Mississippi (May Brook)	
	1200
Early Mississippi (Steed-Kisker)	
	900
Late Woodland	
	500
Middle Woodland (Kansas City Hopewell)	
	A.D. 1
Early Woodland	
	1000 B.C.
Late Archaic (Nebo Hill)	
	3000
Middle Archaic	
	5000
Early Archaic	
	7000
Dalton	
	8000
Paleo-Indian	
	12,000

Figure 2. Cultural sequence in the Little Blue Valley.

Shippee states that these were all found on hilltop sites and were mixed with points from later assemblages, especially Dalton and Nebo Hill. Wedel (1959: 175) shows four fluted points found by local collectors in northeastern Kansas, indicating a similar sparse distribution immediately to the west of the project area.

It is presumed that the limited number of fluted points in the Lower Missouri Locality indicates little usage of the area by Paleo-Indian hunters. In addition, the limited number of fluted points reported for the region does not allow estimation of subperiods (based on style differences of the points) for the period as a whole.

Chapman (1975) and Shippee (1964), based on the previously mentioned surface finds of fluted points in Missouri, have suggested a settlement pattern for Paleo-Indians involving highly mobile nomadism and temporary hunting camps on hilltop overlooks. Chapman (1975:67) mentions the "possibility" that early Holocene alluviation may have eroded campsites located on terraces and flood plains.

In summary, although Paleo-Indian occupation of western Missouri is documented by surface finds, there is little data regarding settlement, subsistence, demography or culture history of the period.

DALTON PERIOD

The Dalton period of 8000-7000 B.C. is viewed as a transition time involving a shift from an economy focused on big game hunting to a more diversified economy involving increased use of smaller game and collection of plant products. A Dalton horizon appears to be widespread in the eastern and southeastern United States and to be correlated with the late Plano tradition of the western Plains and the Southwest. The Dalton period in Missouri coincides with a generally warmer early Holocene climate and the replacement of spruce-pine boreal forest with a mixed deciduous forest-prairie environment.

Surface finds of Dalton period bifaces are common in Missouri, particularly near major rivers, but only three excavated, well studied sites provide good evidence of this period (Chapman 1975). All three sites are rock shelter or cave sites in major river valleys. Rodgers Shelter (McMillan 1971) in the Pomme de Terre valley of the Ozark Highland region south and east of Kansas City contained Dalton forms in its lowest levels. Also included was a single Clovis fluted point and a probable Plainview point, along with scrapers and flake tools common in Paleo-Indian and Dalton period tool kits. Graham Cave (Logan 1952; Klippel 1971), in the Northeast Prairie region east of Kansas City, contained the most extensive collection of Dalton forms and associated tools in a relatively well scaled and dated context. Arnold Research Cave in Callaway County near Graham Cave also produced Dalton forms and associated tools in its earliest levels (Chapman 1975: Shippee 1957, 1966).

Faunal remains from these three sites indicated that subsistence strategies focused on hunting and butchering of deer and small mammals. Plant (seed) processing is indicated by sandstone pestles and grinding stones.

It is uncertain exactly how these three rockshelter sites fit into a Dalton settlement pattern and how typically they indicate Dalton subsistence practices. It is probable that Graham Cave, Arnold Research Cave and Rodgers Shelter represent hunting camps located some distance from a Dalton base camp. Presence of seed processing tools at Graham Cave may indicate a wider functional range. If these are hunting camps, it is possible that Dalton base camps were located in riverine areas, on flood plains or terraces. These, like potential Paleo-Indian sites discussed above, may have been eroded during the early Holocene.

EARLY ARCHAIC

During the Early Archaic period of 7000-5000 B.C., climate, flora, and fauna became similar in Missouri to that of the present day. A mixed prairie and deciduous forest probably was characteristic of most of the northeastern portion of the state, including the present project area. Evidence dating to this period shows a somewhat higher population, greater reliance on forest products (particularly the gathering of plant resources), and a much wider variety in tool morphologies. Caldwell (1958) has referred to the Archaic period as a time of development toward "primary forest efficiency" during which human groups gradually learned to exploit forest resources and make their lives more secure. This intensive subsistence effort in a regionally expanding and developing forest structure is an important characteristic of the Archaic period.

A variety of projectile point styles have been described for Missouri indicative of Early Archaic occupations (see Chapman 1975). These include lanceolate forms (Rice Lanceolate, Agate Basin Lanceolate), stemmed forms (Hardin Barbed, Hidden Valley Stemmed, Rice Contracting Stemmed, Rice Lobed), corner notched forms (St. Charles Notched), and side notched forms (Graham Cave Notched). Dalton forms (concave, thinned bases on basically lanceolate blades) are also commonly seen as extending into the Early Archaic.

The meaning of this morphological variety is presently unclear. Based on excavated samples from Rodgers Shelter (McMillan 1971), Graham Cave (Logan 1952), and Arnold Research Cave (Shippee 1957,1966), the various forms appear to be contemporary, although it is possible at all three sites that separate Early Archaic occupations were mixed together. It seems probable, however, that the forms were contemporary; lanceolate, stemmed, and notched forms occur together also in relatively well documented Middle and Late Archaic levels at these three sites as well as at numerous other probable single component sites of the Archaic.

Settlement-subsistence patterns for the Early Archaic are not well understood in Missouri, particularly in the Kansas City area. A more diverse artifact assemblage is present, with numerous scrapers, knives, edges, celts, and grinding stones (Chapman 1975). Too few sites have been recorded, however, to establish a detailed settlement pattern or demographic estimates.

MIDDLE ARCHAIC

The Middle Archaic period of approximately 5000-3000 B.C. in Missouri appears to be a continuation of the Early Archaic with continued economic diversity represented by addition of grooved axes and celts and the apparent first extensive use of fabrics and cordage (Logan 1952; Chapman 1975). Projectile points maintain the variability discussed above for the Early Archaic, with the addition of a variant stemmed variety usually referred to as basally notched (Chapman 1975). The Coffin Site, 23JA200, located on the uplands south of the project area is considered by Reeder (1977) to date to the Middle Archaic period. Projectile points from the site include medium-sized side notched points. Chapman (1975:158) sees a generally more diversified economy, with a greater orientation toward hunting of small mammals and plant collecting. He correlates this with the general increased temperature and aridity postulated for this period and the increase in prairie over much of Missouri. There is, however, little direct evidence in Missouri for such economic change during the Middle Archaic, and the same research problems and general lack of data pertain to this period as to the preceding Early Archaic.

LATE ARCHAIC

During the Late Archaic period of about 3000-1000 B.C., the major component recognized in the Kansas City region is known as Nebo Hill. First described by Shippee (1948), Nebo Hill was thought to represent an Early Archaic or Late Paleo-Indian complex because of its characteristic well made Lanceolate spear points and their similarity to Eden, Agate Basin and other late Paleo-Indian points to the west. Reid's (1978) more recent word at the Nebo Hill type site in Clay County just north of the Little Blue Valley has confirmed a Late Archaic age for this complex.

The chipped stone tool assemblage from the Nebo Hill complex has always been recognized as being similar to that of the Sedalia complex to the east in north central Missouri. The Sedalia assemblage includes lanceolate points similar to Nebo Hill points, but is not so dominated by this form as is the Nebo Hill complex; Sedalia also includes stemmed forms, such as the Stone Square Stemmed, that are rare in Nebo Hill sites (Chapman 1975:184-217). The Sedalia complex assemblage also includes large, bifacially worked axes (Sedalia diggers), and smaller, usually unifacial adges (Clear Fork gouges). These latter two tool forms are also present in the Nebo Hill assemblage, but are much more rare than in Sedalia sites.

To the west of the Kansas City area, Witty (1969) has described an Archaic component at the William Young site. This component contains high proportions of bifacial axes or diggers and unifacial gouges similar to the Sedalia complex. Schmits' (1981) Black Vermillion phase at the Coffey site contains similar artifacts, including lanceolate and stemmed points, as well as Clear Fork gouges. The El Dorado and Walnut Late Archaic phases apparently follow Member Creek and Black Vermillion, and are widespread over eastern Kansas (Grosser 1977; Schmits 1981).

The Nebo Hill complex extends south from the Kansas City area to the Upper Osage River area where components were recognized in the northern part of Truman Reservoir by Joyer and Roper (1980). This area apparently marked an ecotone between a primarily prairie zone, while the forest zone contained Late Archaic components with a variety of stemmed poit styles.

Reid (1978, 1980) and Reeder (1978, 1980) have described the only two excavated Nebo Hill sites prior to our work in the Little Blue Valley. Reid excavated several seasons at the Nebo Hill site, the type site for the complex. Reid interprets the site occupation as a summer to early fall encampment established by a temporarily nucleated group of hunter-gatherers (Reid 1980:37-38). Reid hypothesized a seasonally scheduled settlement pattern involving Large Lepland camps during the warm weather months, directed toward exploitation of upland area resources. In the cooler months, the temporarily nucleated camps would have separated into smaller groups and moved to sheltered locations in stream valleys. Reeder's (1978, 1980) excavations at the Sohn site in the Little Blue Valley provided data supporting this settlement model. The Sohn site was much smaller than the Nebo Hill type site, but it contained artifacts representative of a wide range of activities, indicating a probable habitation rather than special purpose function. Sites of similar size and location on the flood plain were discovered by Martin (1976) in the Fishing River Valley approximately 15 km northeast of the Nebo Hill type site. Although Martin hypothesized that these small, lowland sites were special purpose camps based on their limited tool assemblage, Reeder (1980) notes that these were only surface collections and that the Sohn site appeared on the basis of its surface collection to have a limited tool assemblage. Excavations at Sohn showed the site to have a wide range of tools; perhaps the surface collections have been biased by years of relic hunter collecting.

Fiber-tempered pottery in small quantities was discovered by Reid (1978: 247) at the Nebo Hill site. This represents the western most occurrence of this early pottery form, well separated from other occurence of this early pottery form, well separated from other occurences in the Southeast and the Lower Mississippi Valley. While such pottery may occur in the contemporary Sedalia and Titterington complexes to the east, none has so far been recognized. This early pottery is a good indicator that populations in the Late Archaic, Nebo Hill phase were becoming technologically more sophisticated, more sedentary, and also were probably increasing in numbers.

EARLY WOODLAND

The Woodland period as defined by Chapman covers the time 1000 B.C.-A.D. 900 (Chapman 1980:1) and is considered comparable to traditions and periods recognized in the Eastern United States. This period is characterized by the presence of pottery, funerary elaborations (burial mounds, specialized grave goods), and incipient horticulture. Chapman (1980:1) subdivided the Woodland period into Early Woodland (1,000-500 B.C.); Middle Woodland (500 B.C.-A.D. 400); Late Woodland (A.D. 400-900). Although these subdivisions are applicable for a very broad portion of the eastern United States, the correlation of these time periods with the cultural practices noted above is difficult considering the data base which exists for the Kansas City area and the Northwest

Prairie Region. It is therefore useful to define the local Woodland Period on the basis of recently acquired data from this area.

Brown and Ziegler (1979:5) consider the local Early Woodland to cover the period between 500 B.C.-A.D. 1. Sites assigned to this era are few, although these occupation have only been recently recorded. The Traff site, 23JA159, is located on the East Fork of the Little Blue in Jackson County (Wright 1980). The site yielded Early Woodland Morton-like ceramics and radio-carbon dates of 395$\pm$70 B.C. (UGA-2535) and 505$\pm$80 B.C. (UGA-2404). Two smaller sites in the Little Blue drainage indicate occupations during this period. Site 23JA36 was dated to 450$\pm$85 B.C. (UGA-1973) and contained ceramics similar to Early Woodland types from Missouri and Illinois (Brown and Ziegler 1979), although not in direct association with the C-14 date. Site 23JA40 yielded a C-14 date of 350$\pm$110 B.C. (UGA-2351) but with no ceramic associations.

The chipped-stone industry for these sites is characterized by procurement of local cherts for the production, in part, of a series of subtriangular corner-notched points. It is further characterized by minor proportions of point styles seen in the Late Archaic and Middle Woodland periods (Wright 1979).

Subsistence practices inferred from faunal remains at the Traff site indicates that there was no obvious deviation from the range of species exploited during earlier and later occupations (Wright n.d.). Adair (1980) determined that the floral species represented are commonly occurring plants found in abundance surrounding the sites. The species are nutritionally complete and easy to collect in large quantites. This efficient, well-adapted strategy is well-documented and has been recorded at Late Archaic occupations such as Koster site (Asch et al. (1972), the Coffey site (Schmits 1978) and the Nebo Hill site (Root 1978)). Thus, the current distinguishing characteristics of the local Early Woodland compared to the preceding Late Archaic is the presence of non-fiber tempered ceramics and a subtriangular (rather than lanceolate) point industry.

Thus, the paucity of dated Early Woodland sites in the Kansas City area may indicate that a Late Archaic lifestyle persisted in the area until more dramatic Woodland influences were felt about A.D. 1. Although Chapman (1980) sees a Black Sand phase for western Missouri during this time, the Black Sand phase pottery, grit tempered with cord marking and incised ruins, is very rare. It is certainly not as obtrusive in the Kansas City area as it is in its Lower Illinois River Valley center.

MIDDLE WOODLAND

Middle Woodland, or Kansas City Hopewell, corresponds to the time between A.D. 1 and 500 (Johnson 1974), and is the most thoroughly investigated period in the Kansas City area. Kansas City Hopewell sites are best understood in Platte County, immediately north of the Missouri River and Kansas City. Much of the data is interpreted in a volume edited by A. Johnson (1976) and by E. Johnson (1975), Adair (1977), P. Katz (1976), Bell (1976) and Brockington (1978). Largely, research has focused on settlement/subsistence patterns and

formal variability of chipped-stone and ceramic products. One development from these studies is refinement of the hypothesis originally expressed by Wedel (1943) that the Lower Illinois River Valley may have been a point of origin for chipped stone and ceramic manufacturing traditions seen in the Kansas City locality between A.D. 1-500. These presumably found their way to the Kansas City locality by way of westward migrations of people from Illinois at about the time of Christ (Johnson 1976a). Incipient horticulture is noted by small amounts of cultigens but this is not regarded as major contribution to the diet (Johnson 1976a). By contrast with the Early Woodland, Kansas City Hopewell sites are characterized by the presence of trash-filled storage pits, ovate corner and basal-notched points and Havana, Hopewell and Weaver type pottery similar to Illinois Valley types (Johnson and Johnson 1975; Chapman 1980).

Johnson (1976a) has proposed a detailed settlement model for Kansas City Hopewell involving large, permanent villages at the mouths of streams tributary to the Missouri, with smaller camps located in the upper reaches of the tributary valleys. Large villages are spaced 5-10 miles apart in a relatively regular pattern, perhaps indicating the necessary catchment territory size. Special purpose camps that appear to have evolved into small habitation sites late in the Kansas City Hopewell period are located further up the tributary valleys. This settlement pattern apparently extended from the Kansas City area northward along the Missouri to about St. Joseph. Hopewell-related sites are found to the west in the Kansas along the Kansas River, but are very rare.

Faunal and floral evidence from excavated storage pits at several Kansas City Hopewell sites indicates that the groups were dependent primarily on hunting and gathering wild foods, although a very small amount of squash and corn have been isolated. At the large, tributary mouth villages thick middens are evident, and trash-filled pits, probably originally dug as storage facilities, are common. However, no evidence of structures has been encountered. Burial mounds were often located on bluff tops above the major villages, but these have apparently all been located by relic hunters; none remain undisturbed.

Close similarity in ceramic and stone tool styles to Hopewell sites in the Lower Illinois Valley indicates a strong relationship to that center of Hopewell activity. Wedel (1943) originally hypothesized a westward migration of Illinois Valley peoples to the Kansas City area, and the finding of a series of similar sites along the Lower Missouri Valley lends confirmation to that idea.

LATE WOODLAND

For the Kansas City area this period extends from A.D. 500-900. It is distinguished from the Middle Woodland or Hopewellian period by the disappearance of the once widely distributed Hopewellian traits and by a decided decrease in number and size of sites.

Late Woodland is well represented in the Kansas City area (Johnson 1974; Martin 1976), with small, dispersed, sites marked by the diagnostic presence

of thick, heavily tempered, cordmarked pottery and small corner-notched projectile points, presumably the tips of arrows. To date, excavations have been conducted at only a single occupation area, 23JA85, the Sperry site (Brown and Ziegler 1979; O'Malley 1979). According to O'Malley (1979:1), "the site is located on a terrace just above the Little Blue River at an elevation of approximately 750 feet above mean sea level. Archaeological operations, which included a large block excavation and scattered test pits totalling 672.5 square meters, uncovered five features including four pits of varying dimensions and a ground stone concentration." Also, "bone and seed remains (indicate) that the site was probably occupied during the fall and/or winter. Several characteristics including the thin vertical extent of the cultural deposits, the low number of features and the results of the soils analysis are offered as evidence of a small group inhabitating the site for a short period of time, perhaps only for a season or a few months" (O'Malley 1979:108). Charred seeds recovered from the site included no tropical cultigens. An averaged corrected radiocarbon date for the Sperry site is A.D. 745±50 (Brown and Ziegler 1979:5).

Little is known to account for the apparent decrease in size and complexity of sites during the Late Woodland period. Although climatic change has been proposed as a stimulus for the "cultural decline" common to a large portion of the Midwest during this time, evidence of a dramatic climatic shift is not present. Perhaps the introduction of productive horticulture allowed a social reorganization to take place, with fragmentation into a large numbers of small, independent farmsteads.

The Woodland period (Early, Middle and Late) in the Kansas City area generally follows the sequences of traditions outlined by Chapman (1980). A difference is seen, however, in the timing of these traditions in that Kansas City area traits occur somewhat later than more easterly complexes. For example, what is referred to statewide as the Early Woodland (1000-500 B.C.) does not occur until about 500-300 B.C. in the Kansas City locality. In addition, the Middle Woodland period in the Kansas City area is thought to represent the time A.D. 1-500, although the statewide Missouri sequence hypothesizes 500 B.C. to A.D. 400 for this period (see Fig. 2).

MISSISSIPPI PERIOD

This period is considered by Chapman to occur between A.D. 900-1700. Regionally, permanent villages and farming were the traditional practices, and, in the more populated settlements, sites are characterized as fortified civic-cermonial towns. Locally, Mississippian traits are best represented by the Steed-Kisker phase. These occupations were not as "civically" oriented as the larger, eastern villages and are considered a "weak development" of the tradition (Chapman 1980:138). The Steed-Kisker occupation of the Kansas City locality, known since the time of Wedel's investigations in the 1930's (Wedel 1943), has recently been the focus of intensive research by O'Brien (1978). Based on an economy divided between hunting and gathering and corn, beans, and squash agriculture, the Steed-Kisker population lived in dispersed farmsteads, with one form of social integration focused on mortuary ritual. The presence of earthlodges and sand-tempered cordmarked pottery aligns Steed-Kisker with

Central Plains tradition complexes to the north and west, while post-trench houses and shell-tempered plain pottery indicates affiliations with eastern Mississippian developments. Radiocarbon dates indicate the Steed-Kisker phase was in existence between A.D. 1000 and 1250.

Recently, a May Brook phase has been provisionally defined by Brown on the basis of excavations at the Seven Acres site (23JA115) and comparisons with data from the Maybrook site (23JA43) (Schmits 1980). According to Brown (1979), May Brook is "an archaeological complex along the middle reaches of the Little Blue River, Jackson County, Missouri, which dates later than A.D. 1200. Distinctive pottery (sherd-tempered and cordmarked) and projectile points (multiple side-notches) indicate the need to establish a new archaeological phase, here defined as the May Brook phase, within the Kansas City locality.

May Brook phase sites are similar to those of the Pomona focus of eastern Kansas (Witty 1967:1-5). The sites are characterized by small triangular corner and side-notched points, sherd tempered cordmarked Pomona ware and a hunting-gathering economy which was minimally supplemented by horticulture (Schmits et al. 1980). Another relationship is seen with Fishing River Middle Ceramic sites located on the Fishing River drainage just north of the Missouri River (Martin 1976). It is suggested that these sites are related to both Steed-Kisker and May Brook phases, based on site locations and similarities between ceramic and point styles (Martin 1976; Schmits 1980).

The exact relationship of Steek-Kisker and May Brook is at present uncertain, as is the relationship of May Brook to Pomona. The May Brook phase may represent an eastward movement of Pomona peoples faced with an eastern Kansas drought about A.D. 200. Steed-Kisker folk may never have inhabited the southern Kansas City area, or may have moved farther east or north at this time.

PROTOHISTORIC AND HISTORIC PERIOD

Archaelogical evidence of Indian sites after May Brook occupations is lacking for the Little Blue valley, although a modified form of the May Brook phase may have continued well into the protohistoric period. The Osage, Ottoe, Kansas, and Sac Indians are recorded as moving through or hunting in the general Kansas City area in the 1700's (Holder 1970), although no remains of their villages or camps are presently known (Shippee 1972). By 1800 the Kansas Indians were considered as holding the territory around Kansas City. After Missouri statehood in 1821, there was pressure to resettle them, culminating in a treaty in 1825 in which the Kansas ceded their lands (Institute for the Development of Indian Law n.d.).

European-American use and settlement of the Kansas City area probably began in the late 1600's with incursions along the Missouri River by French fur traders (Holder 1970). In the late 1700's French claims were ceded to Spain; however, the Spanish made little effort to expand control as far west as the Kansas City area, and ceded control back to France in 1800. French traders operating out of St. Louis continued their business with the various Indian groups up the Missouri River.

A new era began in 1803 with the purchase from France of the Louisiana Territory. After the Lewis and Clark expedition passed up the Missouri, Ft. Osage was established in Jackson County to prevent Indian raiding. A small settlement grew up around this fort, and by 1810 gypsum mining was being carried out along the Missouri and Big Blue Rivers (Nichols 1969; Jackson 1962). In 1821 Missouri was admitted to the Union, and in the same year Francois Choteau established a trading post on the present site of Kansas City. Jackson County was incorporated in 1826, and Independence was the county seat. Westport Landing was established in 1839 west of Independence and by the mid-1840's rivaled Independence as a thriving trade and outfitting center.

Settlement of Oregon, California, and Texas in the 1840's and 1850's increased traffic through Independence and Westport, helping to create a thriving commercial center. Jackson County in 1860 was recorded to have a population of over 20,000 (Poppino 1964).

Jackson County had a slave population of about 3,000 in 1860, and although Missouri remained a Union state, there was much sympathy for the Confederacy. One minor battle took place at Byram's Ford near present day Swope Park to the east of the Little Blue Valley (Lewis 1923).

After the Civil War Kansas City became a commercial and railroad center and began to develop industries to serve the agriculture communities of Kansas, Missouri and surrounding areas. By the 1890's the major industry was meat packing, and large stockyards dominated the Missouri flood plain areas of the city. The Little Blue River Valley remained agricultural throughout this period, with individual farms located on the terraces and bluff tops. The remains and trash dumps of these farmsteads constitute the historical resources identified during the Little Blue Archaeological Project.

CHAPTER IV

RESEARCH DESIGN AND METHODOLOGY

Larry J. Schmits

INTRODUCTION

The construction of Blue Springs Lakes and Longview Lake in the Little Blue River Basin of west central Missouri will create two lakes with a combined coverage of 1650 acres at multipurpose pool level and 2940 acres at flood level. Impoundment of these two lakes will result in the loss of significant cultural and paleoecological resources. Previous research conducted by the University of Kansas (Brown 1977) and the University of Missouri (Reeder 1978) has demonstrated the archaeological potential of the Little Blue Valley for producing significant cultural resources.

Archaeological research with the Blue Springs Lake Project area (Fig. 3) involved extensive data recovery at two sites (23JA35 and 23JA38) and testing at 17 sites (23JA9, 23JA37, 23JA143, 23JA155, 23JA158, 23JA159, 23JA160, 23JA161, 23JA162, 23JA163, 23JA164, 23JA165, 23JA166, 23JA182, 23JA183, 23JA184, 23JA238). At Longview Lake (Fig. 4), extensive data recovery was conducted at three sites (23JA104, 23JA112, and 23JA170) and testing at eleven sites (23JA137, 23JA168, 23JA169, 23JA171, 23JA172, 23JA173, 23JA174, 23JA175, 23JA177, 23JA178, 23JA181).

The scope of work for the present project (Appendix 1) specifed extensive data recovery investigations at six sites and test excavations at 27 sites. One of the sites selected for extensive data recovery (23JA109) was destroyed by pipe line construction before field work was initiated. Two potential significant resources were encountered during the course of the excavation. A deeply buried Late Archaic component was located at 23JA155. A stratified Middle Woodland and Mississippian period component eroding from a cut bank of the East Fork of the Little Blue River was located at 23JA238. In order to test these two potentially significant resources, a change order was negotiated in Contract DACW41-79-C-0006 which specified testing of the buried components at 23JA155 and site 23JA238 in lieu of extensive data recovery at 23JA109. Table 1 shows this work plan.

Based on previous work, four sites scheduled for extensive data recovery were thought to contain Late Archaic Nebo Hill components (23JA35, 23JA112, 23JA104, 23JA170) and four sites Middle Woodland, Kansas City Hopewell components (23JA38, 23JA104, 23JA112, 23JA109) (Brown 1976). Actual field investigations indicated that Late Archaic components were present only at 23JA35 and 23JA170. 23JA112 and 23JA104 contained Woodland components. 23JA38 contained thin Early Woodland and Late Mississippian Period Maybrook phase components. A Late Archaic component was encountered at 23JA155. A Middle Woodland and a second Mississippian May Brook phase component were discovered at 23JA238.

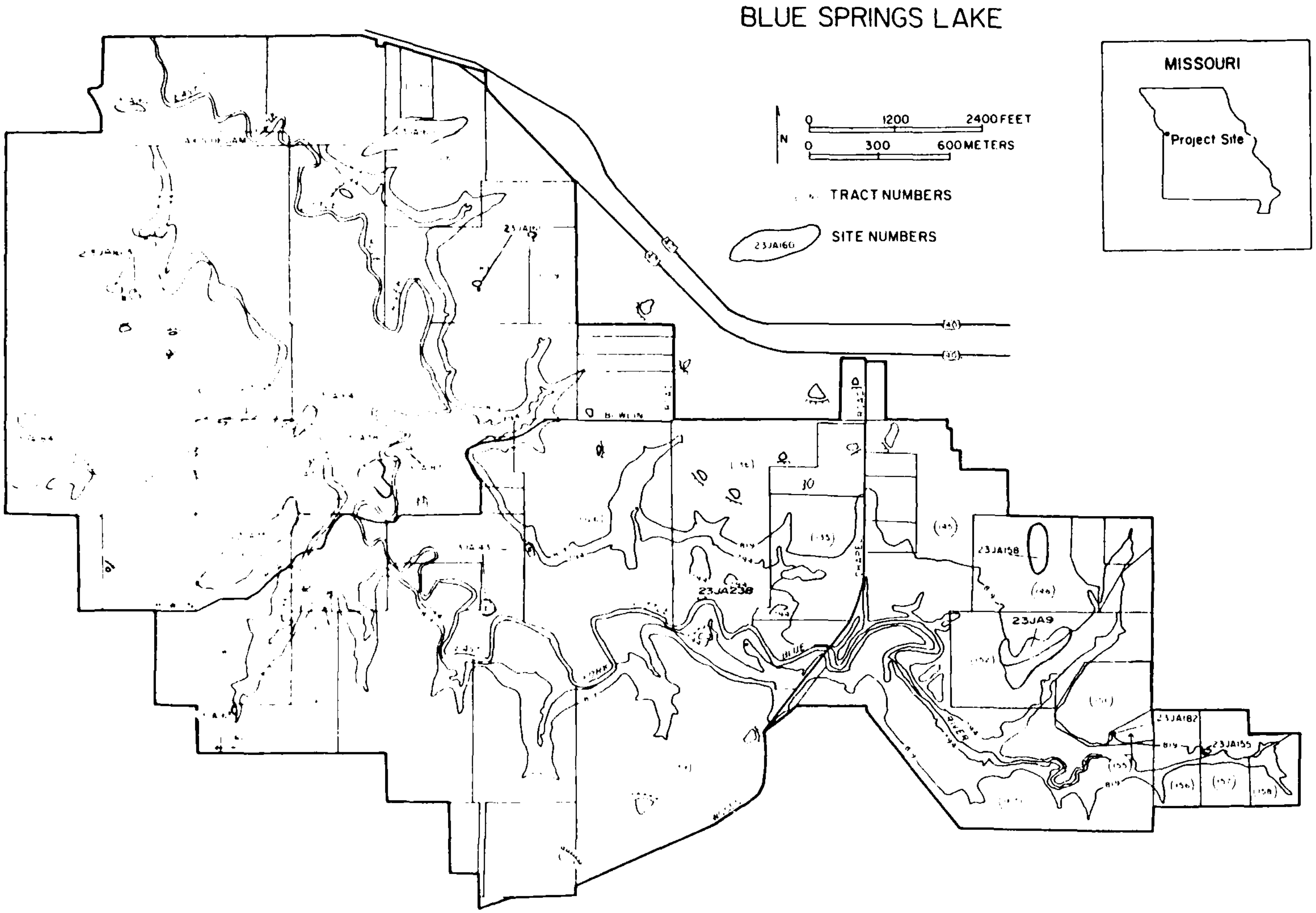


Figure 3. Location of sites selected for testing and mitigation in the Blue Springs Lake area.

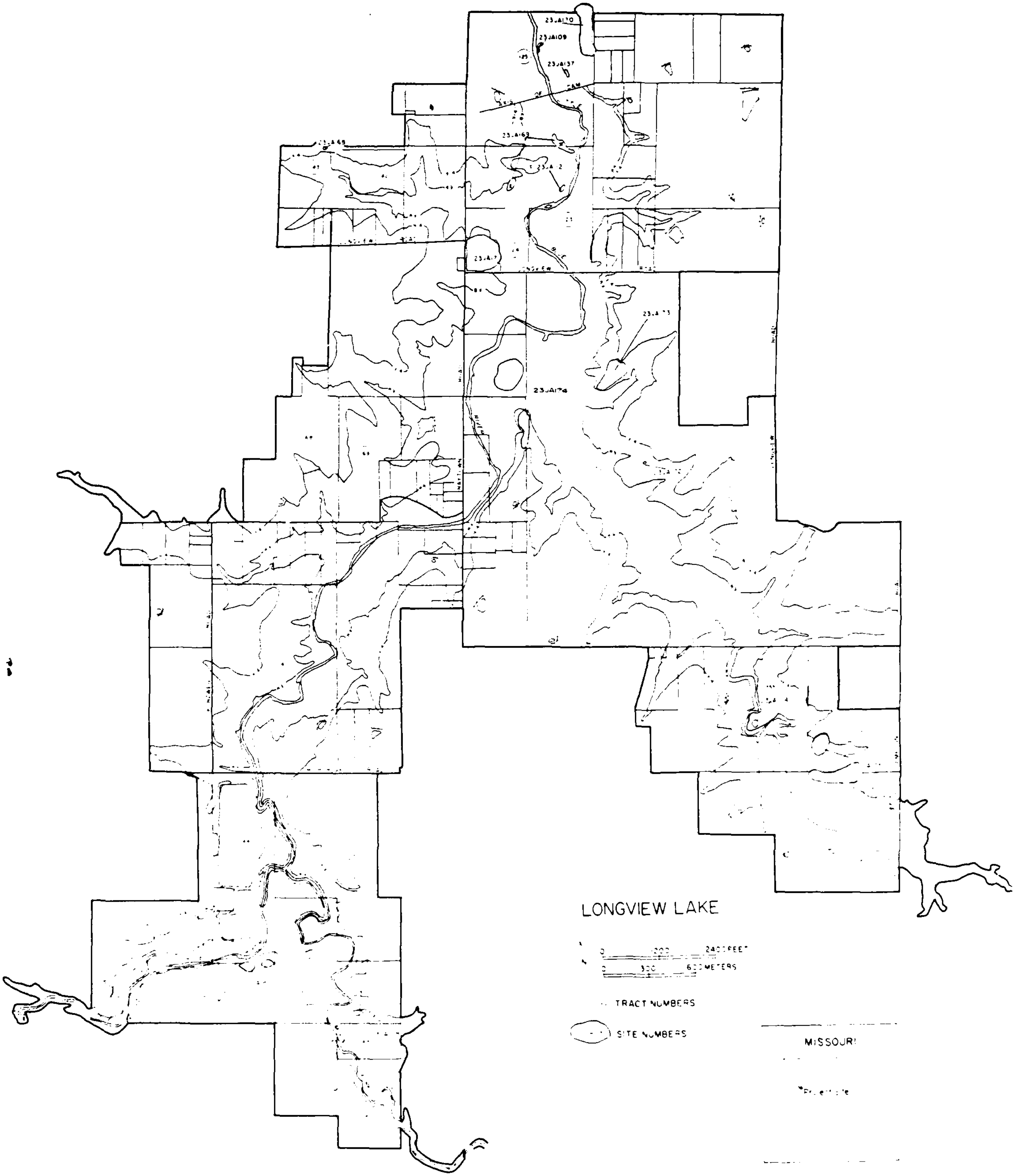


Figure 4. Location of sites selected for testing and mitigation in the Longview Lake area.

TABLE 1

List of sites scheduled for testing and mitigation
and their cultural affiliations

SITE NUMBER	CULTURAL AFFILIATION*	TESTING	MITIGATION
23JA9	Unknown	+	
23JA35	Late Archaic		+
23JA37	Late Archaic	+	
23JA38	Middle Woodland		+
23JA104	Late Archaic, Middle Woodland		+
23JA112	Middle Woodland, Late Archaic		+
23JA137	Middle Woodland	+	
23JA143	Middle Woodland	+	
23JA155	Middle Woodland	+	
23JA158	Unknown	+	
23JA160	?Early Archaic (Dalton)	+	
23JA161	Unknown	+	
23JA162	Unknown	+	
23JA163	Unknown	+	
23JA164	Unknown	+	
23JA165	Unknown	+	
23JA166	Unknown	+	
23JA168	Mississippian	+	
23JA169	Unknown	+	
23JA170	Late Archaic		+
23JA171	Unknown	+	
23JA172	Middle Woodland	+	
23JA173	Unknown	+	
23JA174	Unknown	+	
23JA175	Unknown	+	
23JA177	Late Archaic and Middle Woodland	+	
23JA178	Unknown	+	
23JA181	Unknown	+	
23JA182	Unknown	+	
23JA183	Unknown	+	
23JA184	Unknown	+	
23JA238	Unknown	+	

*From Brown (1977)

In addition to the sites mentioned above, 26 sites required investigation in the form of Phase II testing during which the following types of information were sought: (1) delineation of the horizontal and vertical extent of prehistoric cultural deposits at each site; (2) an evaluation of the significance of the site in the archaeology of the area, and (3) determination of the impact of the construction of the proposed lake.

RESEARCH GOALS

The research goals of this project include refinement of the cultural chronology of the Little Blue drainage, formulation of models of settlement-subsistence patterns, evaluation of the use of tropical cultigens by the prehistoric occupants of the area, determination of lithic resource utilization and an examination of the alluvial history of the Little Blue River.

Culture History

We are faced with minimal knowledge of the local culture history especially for pre-Late Archaic complexes. In addition, the traditions for better known complexes require additional data as new hypotheses are formed from various investigations. These include the Nebo Hill complex, Early Woodland, or Kansas City Hopewell, Late Woodland and Mississippian periods.

Although research projects are structured to specify types of information desired, it is aptly demonstrated and accepted that much new knowledge is unanticipated. For example, the unexpected occurrence of vegetable-tempered pottery from the Late Archaic occupation at Nebo Hill (Reid 1978) required reconsideration of what, other than temporal placement, constitutes characteristics of the Archaic in the Kansas City area. Additional recent developments include the confirmation of the existence of a local Early Woodland tradition in the locality (Wright 1980a). The presence of this tradition clearly indicates that the Late Archaic Nebo Hill complex did not immediately precede the Middle Woodland Kansas City Hopewell as has been postulated by Johnson (1979: 90). Brown's (1979) definition of the May Brook phase based on test excavation data from the Little Blue Valley has been further developed here and well illustrates that the local culture history is in continual need of reevaluation.

Settlement - Subsistence Patterns

The proposed investigation of Nebo Hill sites provided an opportunity to develop a model of Nebo Hill settlement-subsistence patterns for the area. Site 23JA35 is located on a bluff top and covers approximately 100,000 sq m. It is located within one km of a Winterset chert outcrop near the confluence of the Little Blue River and the East Fork of the Little Blue River. Site 23JA170 is located on a bluff top and covers approximately 15,000 sq m. Floral remains recovered by Brown (1976) suggested at least a summer-fall occupation. The Late Archaic component at 23JA155 and the Sohn site are located on the valley floor in areas which would have been subjected to flooding.

Reid (1980:41) suggests that two archaeologically visible cycles in the Nebo Hill settlement pattern are present. Based on his model sites such as 23JA35 and 23JA170 should represent warm weather (late summer and fall) occupations by aggregated groups of hunter-gatherers. Lowland sites, situated on tributary terraces, were probably coldweather occupations established by small groups which sought shelter from cold weather and which recognized the need for increased segmentation during periods of reduced food availability. Since the locations of these Nebo Hill sites conform to Reid's settlement pattern one of the objectives of the study was to attempt to determine seasonality of site occupation and subsistence practices in order to evaluate Reid's model.

A second phase of settlement-subsistence investigations focused on Middle Woodland Kansas City Hopewell sites. A settlement pattern for these sites has been proposed by A.E. Johnson (1974, 1976) based on the Brush Creek drainage in Platte County, Missouri. Large K.C. Hopewell villages were established near, but not on, the flood plain of the Missouri River along tributary streams. Small camps were located upstream from the larger villages in order to serve as satellite and special purpose camps for the maintenance of increasing local populations, especially at the large villages. Although the Middle Woodland sites in the project area did not include large villages, the smaller sites (23JA38, 23JA104, 23JA112 and 23JA238) may represent these small special purpose camps. Analysis of the material culture, especially subsistence related items such as food processors and foodstuffs themselves will aid in determining the activities that took place at these sites.

Johnson (1979) and Reid (1980) agree that there is no significant shift in the subsistence resource base for the Middle Woodland and Nebo Hill. Thus, the contrast between upland sites for the Late Archaic and the absence of such during the Middle Woodland cannot be easily explained by ecological factors such as proximity to different and better food sources. Therefore, the recovery of subsistence related data and refined evaluation of site settlement patterns for the Little Blue project sites should provide information important in explaining the phenomena Reid refers to as alternative responses to essentially the same ecological situation.

The focus of the original research design developed in the early phases of the project was on Late Archaic and Middle Woodland settlement-subsistence patterns. Previous work in the Little Blue drainage encountered little evidence of Mississippian occupation of the area. However, recent investigations at the Seven Acre site (Brown 1979) and May Brook site (Schmits 1980) have documented the presence of a Mississippian period complex which has been referred to as the May Brook phase. While important data regarding this cultural manifestation were recovered from the Seven Acre and May Brook sites, relatively little is known about the total range of May Brook settlement-subsistence patterns. Since May Brook phase components were encountered at 23JA38 and 23JA238 the research design was expanded to include an investigation of May Brook phase settlement-subsistence patterns.

Tropical Cultigens

The use of horticulture by the prehistoric occupants of the Little Blue Valley has considerable implications concerning settlement patterns, social

patterns and use of the drainage area. Cohen (1978) has suggested that the adoption of agriculture results from population increases. Early work in the Kansas City area (Wedel 1943) reported tropical cultigens from the Middle Woodland Renner site. However, more recent work has not produced additional evidence of significant dietary reliance on these products. This presents an interesting situation since gardening is known in the Missouri Ozarks as early as 4300 B.P. at Phillips Spring in the form of squash (*Cucurbita pepo*) and bottle gourd (*Lagenaria siceraria*) (Chomko 1976; Kay 1980). Why and if this casual attention to horticulture and agriculture persisted on a vast temporal and regional scale is one of the goals of the present research.

Lithic Resource Utilization

The most abundant chipped-stone raw material in the Little Blue Valley is Winterset chert. Tabular deposits of this material are easily quarried for regoliths that have formed in the limestone bluffs along either side of the valley. Secondary sources of water rounded Winterset chert cobbles are also available in the upper reaches of the valley and in its major tributaries. Another chert which saw some amount of utilization is Argentine chert. This rock is least understood in terms of color, texture, inclusional and depositional variability. It is known to occur in southern Jackson and northern Cass counties. Because of the relatively small amount of research in these areas, systematic descriptions of its range of characteristics are not widely available.

The loci and frequency of occurrence for lithic raw materials provides information on the logistics of groups occupying the Little Blue drainage. As this type of data is accumulated, interactions with other regions and other social groups can be assessed. Previous research indicates that most raw material utilized for Late Archaic and Early Woodland chipped-stone points consisted of local (i.e. Kansas City area) cherts. During the subsequent Middle Woodland K.C. Hopewell period, the frequencies of occurrence of exotic non-local cherts increases.

Studies conducted for the Westerville chipped-stone industry at Nebo Hill in Clay County (Wright 1980) indicate that although Winterset chert occurred on the site promotory, the overwhelming preference was for Westerville chert which required an eight kilometer round trip to obtain. The use of Westerville chert by the Late Archaic Nebo Hill occupants of the Little Blue drainage has been noted by Reid (1980). To date no chert-bearing deposits of Westerville limestone are known for the Little Blue drainage. The nearest sources are in Clay County, north of the Missouri River. Reid suggests that the occupants of the Little Blue basin were involved in an exchange system with Nebo Hill population north of the Missouri River. If the Westerville points are being imported from the north, the question of why glacial erratics were not imported for use as ground stone tools is raised.

There is also evidence that hematite artifacts are more common in Jackson County than they are in counties north of the Missouri River (Shippee 1962:4). Hematite is abundantly available in the Pomme de Terre River Valley, a little less than 100 km to the southeast and it is possible that the mineral was imported from that locality. Presently, the only long dis-

tance trade or re-distribution link for the Kansas City area is in the form of white cherts from Mississippian formations in central and south central Missouri. If the Pomme de Terre valley indeed supplied hematite seen in the Kansas City locality then another important dimension is added to the interactions of people and goods for the area.

As noted above, few glacial erratics were used for groundstone tools in Jackson County. These materials (Sioux quartzite, St. Cloud granite and greenstones) are found north of the Missouri River at the southern extent of Kansas City glaciation. For the Little Blue occupations, groundstone tools such as metates and abraders are made of sandstone. The source areas for this rock are not presently known.

One of the major objectives of the present project was additional data regarding lithic procurement and utilization patterns. Given the patterns seen in the project area and adjacent counties it is feasible that we will also be able to answer questions regarding differential preferences and redistribution of materials for the lithic industries.

Geological Investigations

Archaeological work in the area indicates a predominance of sites dating to the Late Archaic and Middle Woodland periods. Only one possible Early Archaic site (23JA160) has been located. There are several possible interpretations of this distribution. The Early and Middle Archaic periods are time equivalent to the arid mid Holocene interval referred to as the Hypsithermal (Altithermal). However, it seems unlikely that the area was abandoned during this period since Early and Middle Archaic sites have been located to the west (Schmits 1978; Kay 1971). It is also possible that many Early and Middle Archaic sites are located in the uplands and have not been recognized. A more likely possibility is that they are deeply buried in flood plain alluvium.

Previous geological work in the Little Blue River valley has been conducted by Filer and Sorenson (1977) and Johnson (1978). Based on grain size analysis of cores taken from valley transects, Filer and Sorenson suggest that any prehistoric settlements in the study area would be located near the surface of the present terraces or flood plain. Johnson (1978) notes that two well defined terraces are present on the flood plain of the Little Blue in the vicinity of the Sohn site. The lower terraces (T-0a) consists of alluvium that is late Holocene in age, mainly less than 1,000 years old. The upper terrace (T-1b) began accumulating about 11,000 B. P. and ceased accumulating about 2000 B.P.

Johnson's interpretations are based primarily on analogy with the Pomme de Terre River in Missouri. The T-1 deposits of the Pomme de Terre at Rogers Shelter have produced extensively stratified cultural deposits extending from Dalton through the Late Archaic. If the Little Blue has a terrace sequence similar to that of the Pomme de Terre, many Early and Middle Archaic sites are probably buried in the T-1b terrace. The geological interpretations of Filer and Sorenson, who suggest that any prehistoric cultural resources would be located near the surface extant terraces of flood plains, are clearly in

conflict with those of Johnson. This conflict could only be resolved by further geological work in the area. A major goal of the Little Blue Lakes project has been to define the terrace sequence and fluvial history of the Little Blue River valley fill.

RESEARCH STRATEGY

Field Investigations

Testing Program

The cultural affiliation of 24 of the 27 sites scheduled for testing was unknown or questionable due to factors such as poor surface visibility, low surface debris densities, or absence of cultural deposition of diagnostic artifacts at these loci. The testing program was designed to produce maximum data recovery in order to retrieve time-diagnostic artifacts which would establish the cultural affiliations of these sites. Specific techniques used in the testing phase included grab and gridded surface collecting, discing, plowing and backhoe trenching to locate subsurface midden areas.

The locations of test pits were placed on these initial considerations along with surficial geomorphological interpretations and systematic sampling procedures. One by two m and one by one m excavation units were used to provide the maximum amount of information that could be recovered in an efficient manner. The testing phase of the project was intended to clarify the cultural affiliation of the sites and provided information on the depth of the cultural deposit along with preliminary information concerning the nature of the prehistoric tasks conducted at the sites.

Extensive Data Recovery

The field strategy for data recovery was designed to produce the maximum from the sites before they were inundated. Specifically, data was sought which provided an empirical framework for correlating the human occupation of the Little Blue valley through time, delineation of settlement-subsistence practices, use of tropical cultigens, and exploitation of lithic resources. The concept of mitigation which was implemented included on site field investigations and subsequent analyses and interpretations. The following is a summary of the field strategy used at sites selected for extensive data recovery. These differed somewhat from site to site and are discussed in more detail in following chapters of this report.

The field methods used in the mitigation phase of the project involved testing of select areas of the sites and the opening of large block excavations. Excavation techniques used recorded the provenience of all tools to the nearest cm. Other debris was collected in one by one m excavation units. All features were mapped and photographed. Vertical control proceeded by arbitrary 10 cm or by natural stratigraphy when present. The fill of occupational areas was dry screened when thick middens were encountered.

Flotation and waterscreening procedures were used to recover microscale debris such as carbonized plant remains and invertebrate remains. In general four liter samples were retained from each level in each excavation unit. The entire matrix of all features were retained. These samples were field dried and then returned to the laboratory for processing. A flotation machine similar to Watson's (1976) SMAP was used to process the samples. The samples were sorted into a light portion consisting of seed, nut fragments and charcoal and a heavy portion consisting of small unworked stone, chert debris, etc. Many heavy portions, especially those from sites with high clay content, contained so much relict sediment that sorting was excessively time consuming. These portions were pre-soaked in a Calgon solution, which deflocculated the clays, and then reprocessed.

Geological Investigations

Geological investigations entailed the study of terrace sequences and fluvial dynamics of valley development, and investigation of source locations for lithic materials used by prehistoric inhabitants. Field investigation for terrace sequences and fluvial history of the drainage required inspection of stream channel cut banks, backhoe trench profiles and other natural exposures. Radiocarbon determinations of samples derived from both archaeological and geological contents were used to temporarily bracket terrace and other valley fill deposits which, in turn provided chronological "markers" for sediments and the cultural deposits associated with them.

Source identification for lithic resources focused mainly on the location of Kansas City Group cherts, including Winterset, Westerville, Argentine and Spring Hill. The cherts from these limestones are Pennsylvania-aged rocks which are easily located with the aid of geological reports, including the Geologic Map of the Lee's Summit Quadrangle (Parizek et al. 1968). The objective of this study was to document the variability of chert color, texture and loci of occurrence in order to better identify raw materials and delineate procurement patterns for local chipped-stone industries. Lithic raw materials, such as sandstone, hematite, quartzite and other glacial erratics are likewise analyzed for source identification.

Evidence of prehistoric occupations is sometimes visible by inspection of aerial photographs for anomalous discolorations and surface patterns. Analysis of topography and surficial geomorphology (terrain analysis) was conducted by stereographic examination of U.S. Army Corps of Engineers 1:400 and 1:200 scale aerial photographs.

The distribution and characteristics of pertinent soil types in the project locality are derived from Soil Conservation Service Surveys (Mausel et al. 1976) in order to produce a more refined breakdown of the dominant Blackour-Zook soil association. As well, soils dated during archaeological investigations are employed for establishing temporal sequences for valley and upland deposits.

Laboratory Analysis and Study

The laboratory analysis phase of the project involved the preparation of the following report on the investigations. The analysis and report writing phase of the project involved the following steps.

Biotic Resource Potential

The biotic resource potential of the project area is assessed for present and past floral and faunal components as an aid for interpreting settlement subsistence patterns. The geography area is described as well as climate, growing seasons and hydrological characteristics of the drainage system.

Although present-day vegetation patterns are known, modern activities, such as agriculture and urban development have obscured the patterns present at the time of Anglo-American contact. It was necessary to reconstruct those components, their frequencies and distribution using Government Land Office (GLO) surveys and more recent models of regional vegetation at the time of Anglo contact. Using these data, vegetation zones are described by the tree species present and their relative importance. Finally, resource zones are outlined primarily by the floral and faunal components found within each vegetation zone. The seasonal availability of food sources as they relate to these species is also discussed. These models of biotic resources are used to interpret the seasonal changes in the locality's resource potential and the nature site occupations.

Data Analysis

The treatment of material culture from the Little Blue Lakes investigations involved various analytical procedures designed to achieve the goals put forth in the previous section. There may be a variety of unanticipated material data but, as indicated by previous research there are four formal classes of data which provided the focus of the analysis. Following is a summary of these artifact classes and research procedures.

Artifacts

Ceramic Analysis: Ceramics are known for the Kansas City locality as early as 1605 B.C. at Nebo Hill (Reid 1980) and since they are diagnostic of cultural historical traditions, research strategies were designed for the recovery and analysis of ceramic products. The sherds (rim and body) are described in terms of frequency, shape, temper, inclusions, surface treatment and decorations. Munsel soil chart colors for interior/exterior surfaces, surface treatment and decoration. From these descriptions cultural historical affiliations are determined. When associated with radiocarbon dates, the ceramics provide refinement and expansion of traditional ceramic sequences.

Lithic Analysis: Previous investigations in the Little Blue Lakes project area indicate that the overwhelming majority of material culture available for study consists of lithic artifacts, particularly chipped-stone tools and manufacturing by-products. These materials are classified according to raw material types in order to determine source proximity, abundance and intra-

extra-regional interactions. Artifact morphologies, especially for chipped-stone points, were analyzed toward determining cultural-historical affiliations and technological developments. For large samples of chipped-stone products and by-products, such as that from 23JA35, a detailed study of reduction techniques and raw material procurement strategies is conducted. For the description of most artifacts, analysists' classifications are based on the inferred functional/morphological characteristics of the artifact. This procedure is employed for the purpose of determining the nature of site occupations by the activities inferred from these tools.

Ecofacts

Faunal Analysis: Faunal remains in association with prehistoric human occupations in the Little Blue Lakes project area are poorly preserved compared to large Middle Woodland occupations in Platte, Clay and Wyandotte counties. This may reflect differential discard and storage practices and/or variability in the preservative qualities of the soil matrix. Nonetheless, flotation, waterscreening and hand recovery techniques insure recovery of preserved samples of faunal remains. The faunal remains were identified to the nearest taxa and minimum number of individuals is calculated. The represented taxa are evaluated for their dietary potential (food vs. non-food species), habitat distribution and likelihood of intrusive elements.

Floral Analysis: Flotation of soil matrix, waterscreening and hand recovery procedures were designed to recover minute and macroscopically visible samples of floral remains, including carbonized seed, nutshell and wood. The samples are *identified to the most specific taxa by a botanist and each taxa was* assessed for its frequency. Carbonized vs. uncarbonized specimens were separated in order to determine biases introduced through natural seed rains and other intrusive processes. The carbonized samples, considered to represent flora associated with the human occupation, are analyzed in terms of species distribution, season of availability and nutritional or dietary potential. From these analyses, it is possible to infer the range of procurement patterns for food plants, seasonality of site occupation and subsistence strategies as they relate to modes of productions (i.e. horticulture, agriculture, gathering). Suitably-sized fragments of carbonized wood were recovered for radiocarbon dating of archaeological and geological deposits.

SUMMARY

In summary the archaeological investigations at Blue Springs and Longview Lakes consisted of two major phases. The first phase of the project involved testing of 27 sites to determine their significance. The objectives of these test excavations were to (1) delineate the horizontal and vertical extent of the site; (2) an evaluation of the significance of the site in the archaeology of the area, and (3) determinations of the import of the construction of the proposed lakes. The second phase involved extensive data recovery at five sites and five major goals: (1) refinement of the cultural chronology of the project area, (2) documentation of Late Archaic, Middle Woodland and Mississippian period settlement-subsistence patterns; (3) investigation of the use of tropical cultigens by the prehistoric occupants of the region; (4)

study of lithic resource use and procurement; and (5) geological investigations of the alluvial chronology of the Little Blue Valley.

CHAPTER V

GEOLOGY OF THE LITTLE BLUE VALLEY

Paul R. Kopsick

INTRODUCTION

The human record in the Kansas City area extends back to Paleo-Indian age cultures as evidenced by certain diagnostic lithic artifacts. From the beginning it is apparent that the prehistoric occupants were astute observers and exploiters of the natural environment. The natural setting in areas of known prehistoric occupation had to be able to support the everyday needs of the inhabitants. Sources of food, water and materials to make tools and weapons were essential to these cultures.

This chapter details the geology and geomorphic setting of the Little Blue River drainage basin as it might affect (1) the selection and location of archaeological sites, (2) the availability of lithic resources for prehistoric groups, (3) preservation or destruction of archaeological sites, (4) the likelihood of buried sites, and (5) the age of prehistoric surfaces.

PHYSIOGRAPHIC AND GEOLOGIC SETTING

The Little Blue River drains the central part of Jackson County and a portion of northwest Cass County into the Missouri River (Fig. 5). The valley of the Little Blue trends south-southwest to north-northeast and has cut into jointed and mildly faulted limestones and shales of Pennsylvanian age. The valley is approximately 27 km long and drains an area of roughly 673 square km. This area is part of the Cherokee Lowlands and lies just south of the terminus of the Kansan age continental icesheet. Subsequent glaciations, the Illinoian and Wisconsinan did not advance into the area, but the effects of their presence to the north had direct consequences on the climate and production of landforms.

The Little Blue River is a fourth order stream exhibiting a complex drainage network. The similar orientation of many stretches of the river and its tributaries indicates that drainage has aligned itself along the strikes of faults and joints inherent in the bedrock. The bed of the channel flows over alluvial deposits for most of the valley. In the area of Longview the channel flows over bedrock which serves as a nickpoint or local base level limiting the ability of the river to cut into its bed and thereby changing the pattern of the channel and gradient in the headwaters. The valley walls are composed of alternating layers of limestone and shale covered by aeolian silts

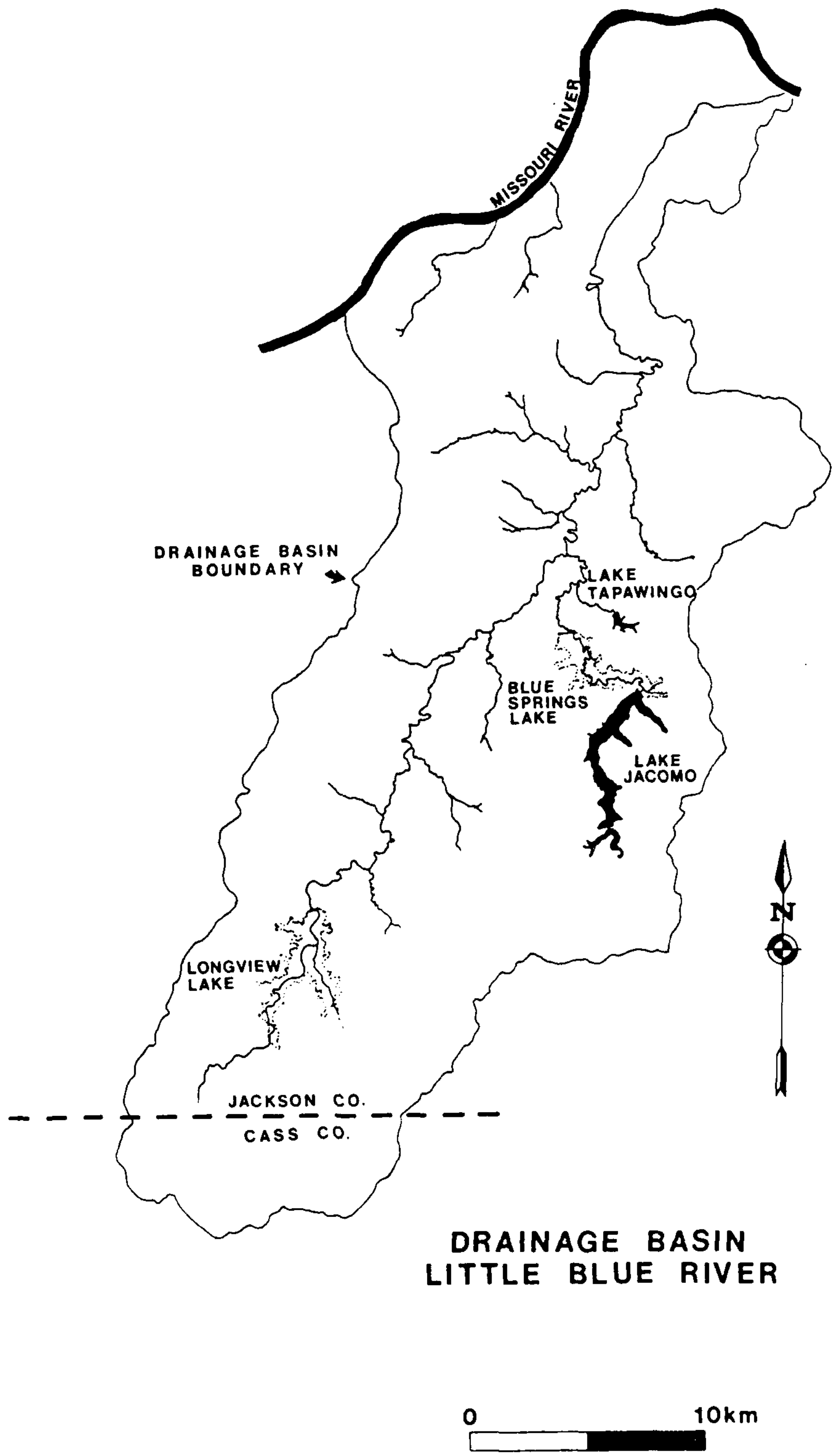


Figure 5. Location of study areas in the Little Blue River drainage basin.

(loess) or regoliths of the weathered bedrock. The alluvial deposits in the valleys are predominately silts and clays with gravelly silts common in the area above and just below the bedrock nickpoint. Majority areas of the flood plain are typified by a broad uneven terrace surface which grades into the hillside slopes. A younger terrace surface is located adjacent to the present channel, and limited evidence of an older terrace is present in some of the smaller tributary valleys.

The two study areas are located within the basin and are 16 km apart. Blue Springs Lake is located on the East Fork Little Blue River in a wide alluvial valley with a meandering channel that drains to the northwest. Longview Lake is located near the headwaters of the Little Blue in a narrow valley with poorly sorted alluvial deposits and a braided-to-meandering channel pattern. Although the two lakes are in the same drainage system there are distinct differences between them resulting from differences in gradient, bedrock control, and overall distance from the mouth of the river. It would take longer for any geomorphic change in the mouth of the river to effect processes in the Longview area than at Blue Springs Lake.

BEDROCK GEOLOGY

The majority of the valley floor is cut into the thick shales of the Pleasanton Group and the overlying limestones and shales of the Bronson Subgroup of the Kansas City Group. These jointed and mildly faulted rocks of Pennsylvanian age belong to the *Missourian Series* (Fig. 6). The depths to which the bedrock valley has been covered by alluvial deposits varies from near zero at Longview to over 20 m near the dam axis at Lake Blue Springs.

The valley walls of the Little Blue are composed for the most part of rocks from the lower Kansas City Group. The Bronson Subgroup is composed of five formations: the lowermost Hertha Formation is overlain by the Ladore, Swope, Galesburg and Dennis Formations in ascending order. The total thickness of these formations averages between 28 and 32 m. Two of these formations are particularly important archaeologically in the local area, the Dennis and Swope Formations.

The Swope Formation contains a member unit called the Bethany Falls Limestone (8 m in thickness), an extremely resistant limestone unit even though it does not contain silicious zones or cherty layers. The upper part of the Bethany Falls is oolitic (containing microscopic calcium spheres) and weathers as a massive blocks up to three m thick. The angular nature of the large blocks, as seen at the outcrop and in aerial photographs, results from the separation of these blocks along joints or fractures followed by rotation of the block downslope over the less resistant Hushpuckney Shale. In part of the valley, these blocks weather to form rock shelters or overhangs. This has occurred when the Hushpuckney Shale has weathered out from below, or when the lower part of the Bethany Falls, which is thinner bedded, weathers faster than the massive upper section.

The other use of the Bethany Falls is as a stratigraphic marker bed that can easily be seen from the field or the air. The massive nature of the

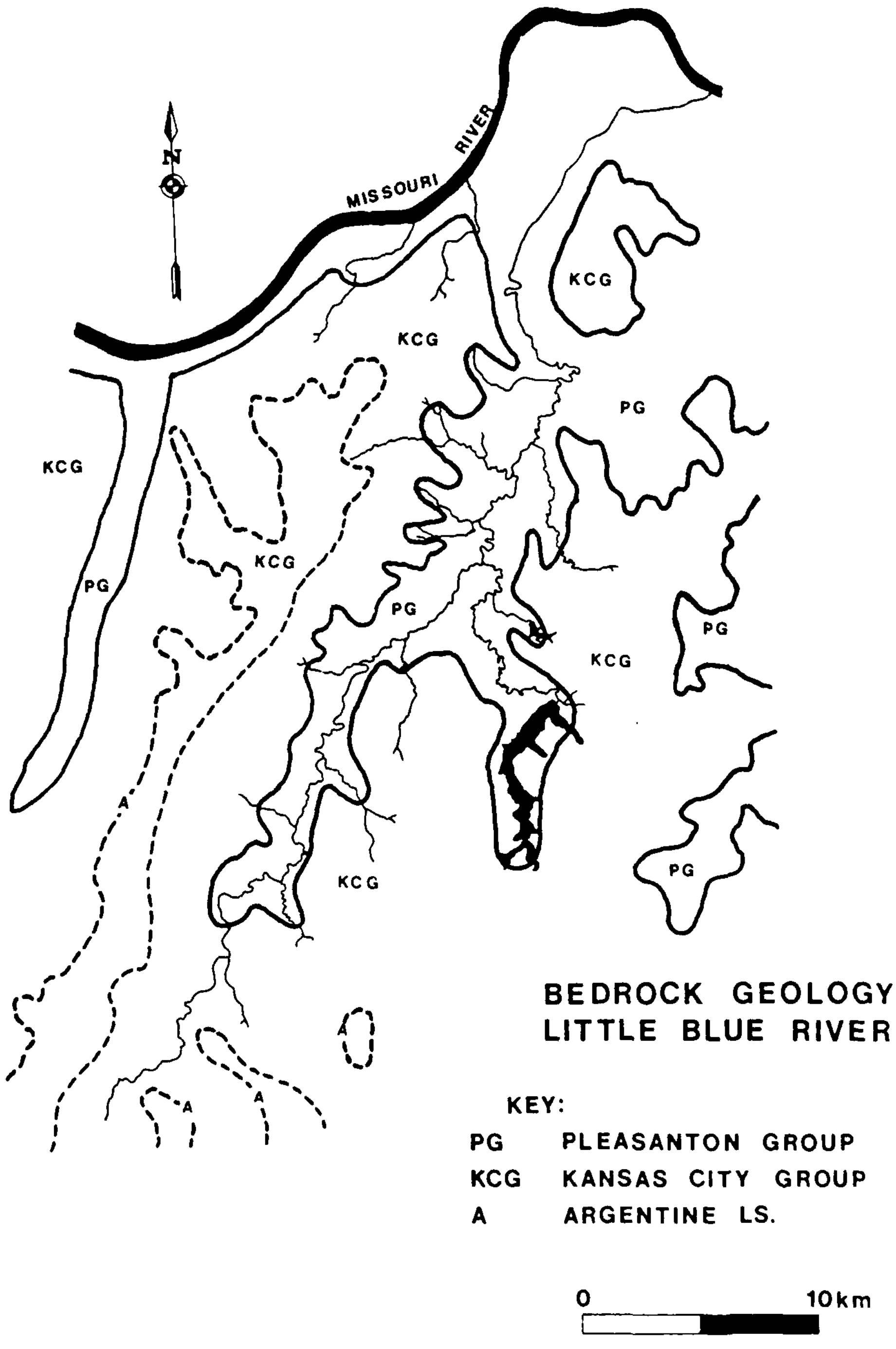


Figure 6. Geologic map of Little Blue Valley. Solid line indicates boundary between the Kansas City Group and the Pleasanton Group; the dashed line indicates the position of the Argentine Limestone within the Kansas City Group. Lake Jacomo is shown as the blackened area.

resistant upper portion coupled with the large angular blocks makes it a striking ledge forming unit. The location of this unit enables one to position other important rock units in the area such as the Winterset Limestone member of the Dennis Formation. The correlation of these rock units by topographic elevation alone is compounded by several faults which have uplifted parts of the valley.

The Winterset Limestone is of great importance locally since it is the major source of high-quality chert in the area. Stratigraphically, the Winterset chert layers are about 10 m above the top of the Bethany Falls Limestone. This stratigraphic association means that a hillside which is roughly 10 m in elevation above the Bethany Falls will undoubtedly contain Winterset chert. All tributary valleys of the Missouri River in Jackson County have the Bethany Falls and Winterset limestones in their valley walls; consequently there is an incredible amount of chert available for tool making. In some areas the chert must have been better or easier to exploit, although the actual number or use frequency of natural outcrops is not known. It is apparent that in the Little Blue River valley there was enough local chert to supply all the sites investigated.

A second chert occurs in the Argentine Limestone and outcrops to the west of the study areas and along the flanks of the drainage basin. A third limestone known to contain chert in abundance in the Kansas City area is the Westerville Limestone of the Cherryvale Formation of the Linn Subgroup (Fig. 7). Since no outcrops of the Westerville chert have been located in either study area this type of chert is not believed to have played an important role for groups living in the Little Blue River Valley.

The Pleasanton Shale outcrops in the headwaters of the smaller tributary valleys. Although shales are generally impervious to water, the Pleasanton Shale has a sandy unit (the Knobtown facies) about seven m below the lowest member of the Kansas City Group (Fig. 7). The Knobtown facies is about two m thick and can be found in incised valleys on the east side of the valley. If this sandy unit has a good recharge, then it would serve as a reliable source of water during times of drought in the Little Blue Valley in general and the East Fork Little Blue in particular.

LITHIC RESOURCES OF THE LITTLE BLUE VALLEY

Introduction

The locations and physical properties of lithic resources were of primary importance to prehistoric peoples. An adequate study of prehistoric lithic use patterns should include the location of available sources of workable stone, establishment of distinguishing criteria for lithic types and the collection of comparative specimens representing the range of variability within each stone type. The following description of lithic resources available to the prehistoric inhabitants of the Little Blue River Valley is based on field observations and collections made in 1979 and 1980.

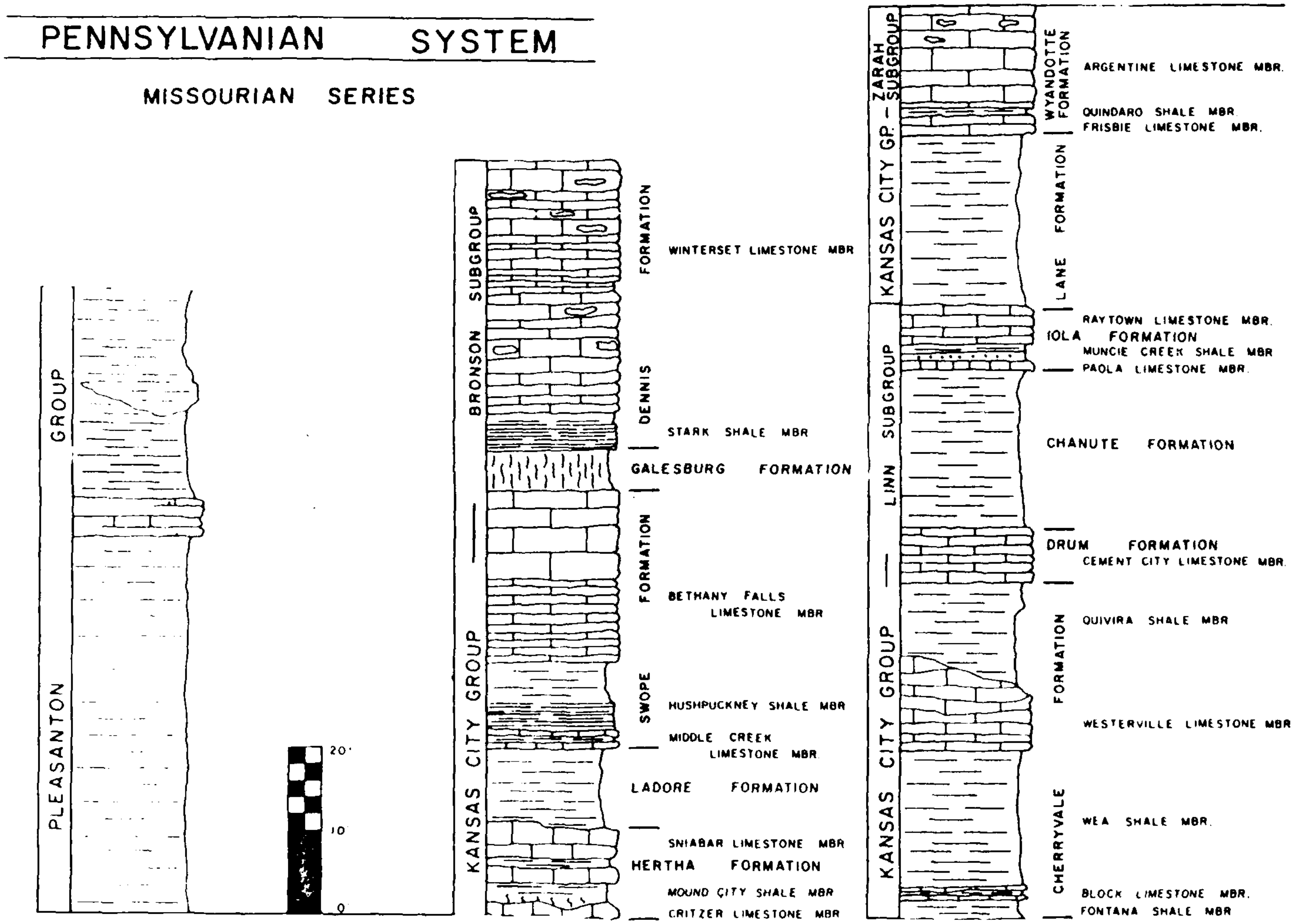


Figure 7. Geologic column of Pennsylvanian Rocks known to outcrop in Little Blue Valley. Pleasanton Group is lowest in the column; Hertha Formation follows the Pleasanton Group. The Cherryvale Formation follows the Dennis Formation, and the Wyandotte Formation is uppermost in the column.

The bedrock of the Little Blue Valley is composed of interbedded limestones and shales several of which are known to have inclusions of distinctive varieties of cherts. The distribution of chert within a limestone stratigraphic unit is variable. Some exposed limestone beds have no or smaller amounts of chert than in other portions of the valley. In addition to bedrock lithic sources, secondary deposits of sandstone, quartzite, igneous and metamorphic rocks occur in glacial tills and streams which have cut through these tills along the Missouri River trench.

The low angle of dip of the Pennsylvanian rocks in this region allows a thin bed of rock to be exposed over a very large geographic area. Therefore a chert bearing limestone is observable from one valley to the next and for good distances up the valleys. The geologic map of Jackson County shows that the Kansas City Group covers most of the county's surface area. This group of rocks, while continuous for over 40 km, is only 90 m in thickness.

Since the dip of these beds is to the west, the younger members (higher in the rock section) outcrop farther to the west. For example, the Argentine limestone is very near the top of the Kansas City Group, and it crops out only in the western half of the county (Fig. 7). Argentine chert can be found in regoliths and stream valleys farther east since at one time these units were continuous to the east.

Types of Chert Deposits

There are several types of deposits from which chert could have been obtained by the inhabitants of the Little Blue River valley. The main source would be from the outcrops themselves where the better quality chert could be obtained. This type of collection would involve quarrying and transportation of the material away from the site. There are enough locations in the valley where the Winterset is close enough to the surface so that quarrying would not have been necessary. Extensive quarrying should be noticable on the modern surface. If quarrying was extensively used, then it was probably on a small scale where the easily removed chert was gathered. The Winterset chert layers are extensive throughout the valley. At modern outcrops the quality of the chert is very good.

Requiring less gathering energy is chert from the weathered surfaces of limestones on the upland and hillside surfaces. These weathered surfaces (regoliths) of cherty limestones contain large quantities of workable chert for making tools. There are several sites (23JA169, 23JA184 and west of 23JA172) where the regoliths are known to contain chert utilized by prehistoric people. Regoliths or residual deposits of chert can be found to the east of the present outcrops since these layers were once continuous over these areas. Cherts found in these deposits have been extensively weathered. Upon weathering, fractures and cracks appear in the chert in response to thermal fluctuations.

Gravels accumulate in response to gravity and rainfall events on flood plains and in the stream channels. With large amounts of chert available, the stream channels in Jackson County are literally choked with chert and limestone gravel. While the size of most of this chert is in the gravel to cobble

size (2-256 mm Wentworth), it has many fractures and uneven surfaces as a result of abrading and transport. This type of chert is not of good quality, but its abundant quantities would seem to lessen the need for quarrying and digging in regoliths for chert.

Descriptions of Local Chert Types

In the study region three limestones contain chert, including the Winterset, Westerville and Argentine Limestones. All belong to the Kansas City Group but to different Subgroups. The Winterset is the oldest, and the Argentine is the youngest stratigraphically. The general locations, descriptions and utilization of these cherts has been studied extensively by Reid (1980) for the Kansas City area, and a detailed descriptive summary of these can be found in his report. Reid's descriptions and accounts of the Kansas City cherts are supported by field work and heating experiments done in conjunction with this study. However, new outcrops of Winterset Limestone in the Longview area add a new wrinkle to the previous identification of brown chert artifacts as being Westerville cherts from north of the Missouri River.

Blue Winterset is found in massive tabular layers and is characterized by white calcite veins running through them. Brown Winterset chert is more nodular and not as extensively broken by veins of calcite. The brown chert is also located lower in cross-section of the limestone, while the gray cherts are found near the top of the section.

Brown Winterset chert occurs as tabular chunks and nodules. This material has a smooth texture and lustrous appearance with the internal structure varying from mottled to homogeneous. Some specimens exhibit white calcite veins and laminae typical of blue Winterset. Some specimens exhibit abundant silicified fossils, giving this chert a speckled appearance. The majority of this type exhibit brown and light tan mottling or layering. Due to the lack of internal cleavage planes, the brown variety of Winterset is easier to flake than the blue variety. Based on heat treatment experiments, brown Winterset exhibits a high degree of surface reddening when heated. No difference was noted in the flaking characteristics after heating.

Reid has noted the predominately grayish colors of the Winterset chert and has mentioned that a pale brown Winterset is present but that this color is due to weathering. In the excavation for the Longview dam, the Winterset Limestone has been freshly exposed and the color of the chert is undeniably brown on a fresh surface. After further examination of the stratigraphy, a second outcrop of Winterset southeast of the Longview area was found to contain brown Winterset chert. In the identification of the chert types of lithics from sites in the Little Blue drainage area a number were noted to be brown in color. Since no brown banded chert was presumed to be local, these artifacts were originally thought to be exclusively Westerville cherts derived from outcrops 50 km north of the area. Identification of brown layered chert south of the Missouri questions previous archaeological investigations in the Little Blue Valley which identified brown cherts as Westerville (Brown 1977, Reeder 1978 and Ziegler 1979) or as weathered blue Winterset (Reid 1980).

Locations of Chert Outcrops

Blue Springs Lake

At the present time, there is no published compilation of the geology in the Blue Springs area. The stratigraphy is similar to other areas, but here the valley is wider and flood plain deposits are thicker and more extensive. In this area, there are no remnants of the Argentine limestone capping any of the bluffs. The nearest Argentine outcrop is about eight km to the west. This does not preclude the possibility of there being regoliths or residual deposits of Argentine chert east of these outcrops and in the Blue Springs study area. Figure 8 indicates a pattern of Winterset limestone outcrops as determined by terrain analysis of aerial photographs and known stratigraphic associations. Several points where procurement of chert was known to have taken place are indicated on Figure 8.

The pattern of Winterset outcrops at Blue Springs and Longview Lake are strikingly different. At Blue Springs the Winterset outcrops are farther away from the center of the valley. Here the valley walls are not steep and the highest rock units are located farther away when viewed in plan. The chert outcrops would not have been as accessible to the flood plain inhabitants, forcing them to go into the tributaries to locate outcrops of chert. This was probably the case with the outcrops at points A and C, Figure 8.

On the flood plain most of the deposits are fine grained silts and clays washing off the uplands, but in the present bed of the channel of the East Fork Little Blue lag gravels are present which contain reworked pieces of chert. The majority of the tools found in the valley deposits were composed of weathered Winterset and Argentine chert, but non-local cherts have found their way into early tool manufacture in the Blue Springs area.

Longview Lake

The Longview Lake area is upstream and to the west of the Blue Springs Lake area and therefore has more outcrops of Argentine chert. Being farther upstream and at higher elevations, the flood plain deposits are thinner and the sediment sizes are coarser. The valley width is narrower so outcrops of cherty limestone are closer to the channel. Figure 9 shows the chert outcrops in proximity to Longview Lake; Winterset chert is extensive and Argentine chert is located nearby. There are regoliths containing Argentine chert in the southern and southeastern part of the valley, and the braided flood plain deposits are an additional source of siliceous material. Chert utilized in the Longview Lake study area include all local cherts as well as cherts from both east and west of the valley.

A probable chert quarry/regolith site is located above 23JA112 on the hill overlooking the valley; above 23JA112, it has been designated as 23JA169. Similar geomorphic situations where regoliths of Winterset chert are located are shown on Figure 9. In this area both blue-gray and tan-brown Winterset chert can be extracted from the stony soils.

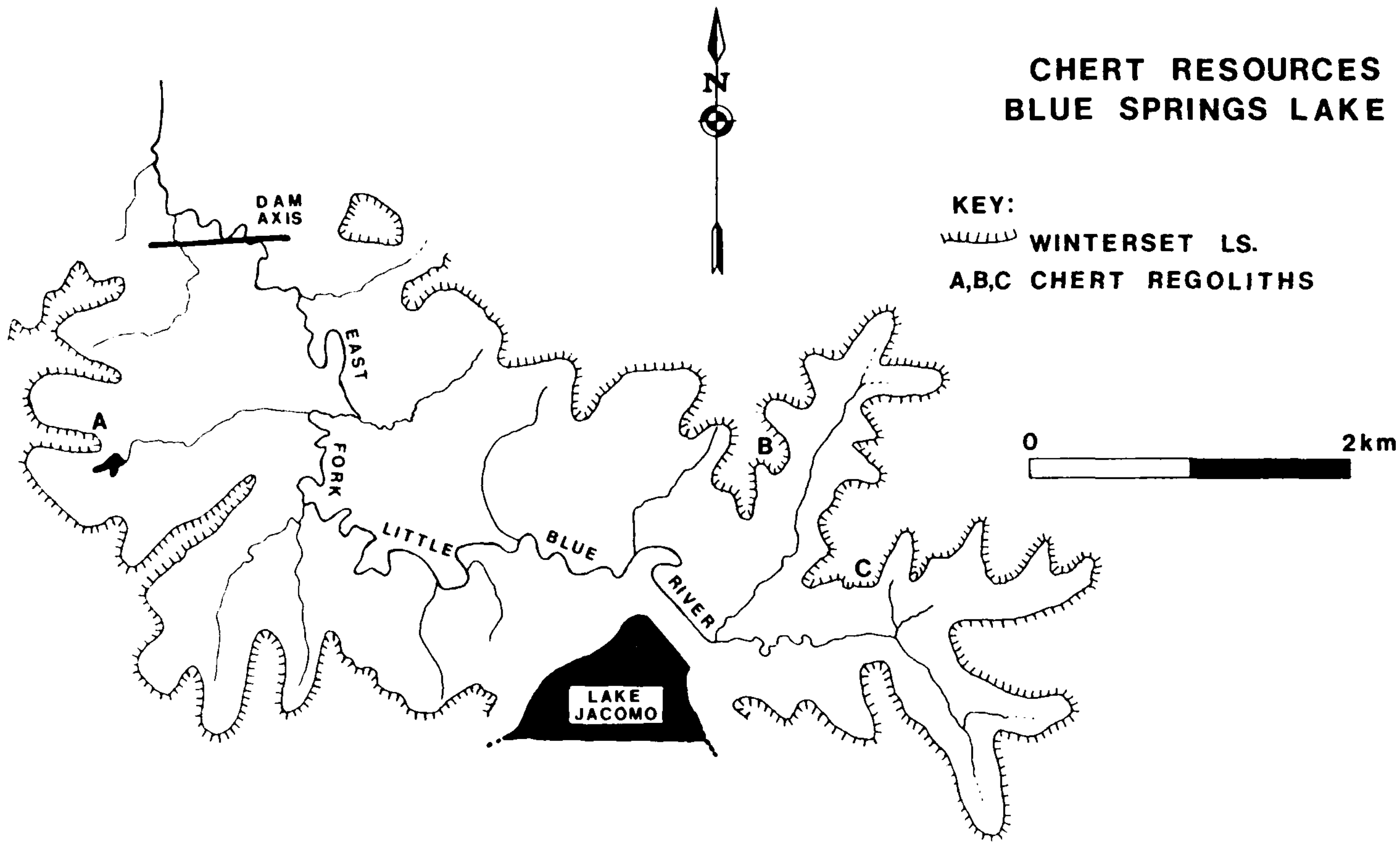


Figure 8. Location of chert resources at Blue Springs Lake.

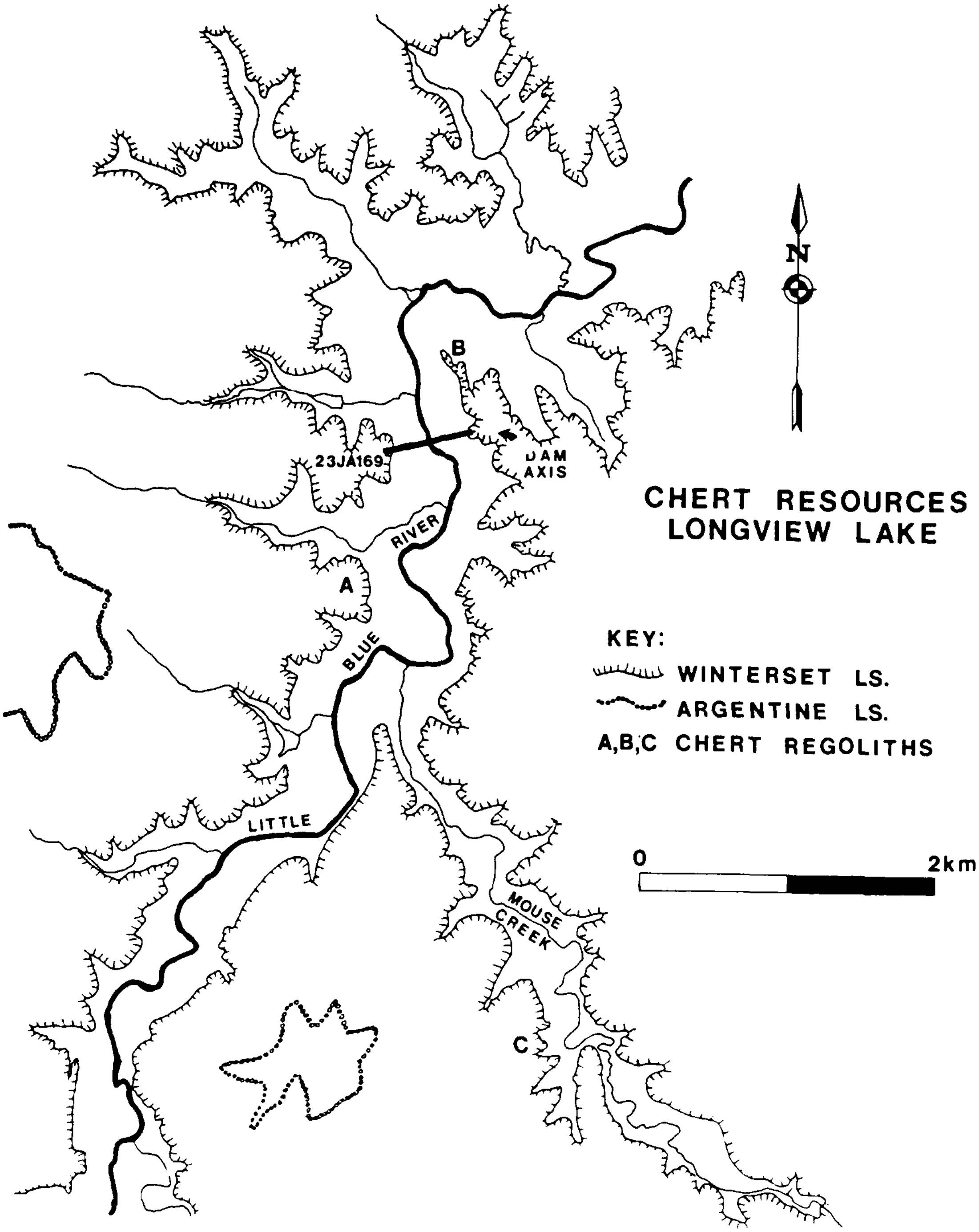


Figure 9. Location of Winterset chert outcrops at Longview Lake.

Non-Local Sources of Chert

Examination of the types of chert artifacts found in the Little Blue River sites indicates that a number of the lithics represent material sources that are not local to the area. Preliminary examinations show that the greatest variety of chert types occurs within the more specialized stone tools like dart points, bifaces and knives. Some of the material for these artifacts are identified as cherts from southern and central Missouri and eastern Kansas. Identified non-local cherts are white Burlington chert, öolitic Jefferson City chert, olive-brown Plattsmouth chert with numerous white fusilinid fossils, and brown-tan mottled Westerville chert. Another chert which may be present is Spring Hill chert. Chert from the Spring Hill Formation does not necessarily have to be considered as a non-local. There is sufficient elevation near Raytown, west of Longview Lake, to contain outcrops or at least residual deposits of Spring Hill chert.

Non-local Sources of Lithics

The Kansan age glacial till deposits in the northern part of the Little Blue Valley served as a source for non-local lithics and anomalous rocks known as glacial erratics. Some of the erratics specifically utilized by prehistoric cultures include quartzites, igneous and metamorphic rocks and certain types of minerals.

Quartzites range in color from pink to white. This category includes both orthoquartzites and metaquartzites, which are separated by the amount of recrystallization of the sand grains. Quartzite is evenly distributed in tills, and its rounded shape and durability are desirable features for use as a mano.

Boulders, cobbles, gravels and sands of igneous rocks, including diorite, diabase, gabbro and basalt, also occur in glacial tills. These specimens with a high chlorite content are commonly referred to as greenstones.

The till-derived lithic varieties could have been obtained from either the Fort Osage Township or the Kansas City glacial drift deposits (McCourt 1917:9). These rocks comprise a minor portion of the mass of these till deposits and could have been readily obtained as sorted stream gravels in minor tributaries which cut through the till deposits.

Minerals

Two varieties of minerals have been recovered from natural and cultural deposits in the Little Blue Valley, limonite and hematite. Local sources of limonite have been found in the upper Little Blue Valley. These specimens occur as surface rubble from Winterset limestone regoliths. This mineral probably occurs in all the limestone beds in the Kansas City region. Limonite is also found in many of the shales of the Kansas City Group and as a cement in some glacial tills. This mineral is a soft hydrous iron oxide which is yellowish-brown in color. Some harder varieties which exhibit conchoidal fracture also occur. This material may have been used for pigment and the

harder varieties may be ground into tools. This material is a naturally occurring inclusion in both upland and flood plain sites.

Two varieties of hematite occur in the Kansas City area. A soft, matte-textured yellowish red variety is present at many of the sites investigated in the Little Blue Valley and is probably derived from the weathering of local limestones. A hard, metallic purplish-red variety occurs less frequently. This latter mineral is suitable as a raw material for tools, most commonly small celts. Although both varieties may occur in the Kansas City area, each is extremely scarce. A known source for the hard variety of hematite is the Pomme de Terre Valley to the southeast. The headwaters of this river are within 25 km of the upper Little Blue River.

SURFICIAL DEPOSITS

Introduction

The Pennsylvanian age bedrock is characterized by limestones and shales representing cycles of marine and non-marine deposition in a broad shallow basin (Merriam 1963:7). Since their deposition and lithification over 300 million years ago they have been subjected to compaction, recrystalization, tilting, folding and faulting. Although minor by most geologic standards, the major deformation of the rocks in the Kansas City area is a low angle tilt to the west. Vertical movement of the layers is limited to minor normal faults with the majority of the faults dipping to the west at high angles. Jointing or breaks are pronounced in the limestones, and are important locally for the production of bedrock outcrops, rock shelters, caves, and in the movement of the groundwater.

The Pennsylvanian rocks were once covered by great thicknesses of younger rocks that have since been eroded away. These younger rocks are now found at the surface to the west. During the last few million years this area has been exposed to the expansion and retreat of continental ice sheets. Of the four known major ice advances, Nebraskan, Kansan, Illinoian and Wisconsin , the Kansan ice sheet extended the farthest south and actually entered into what is presently the drainage basin of the Little Blue Valley. It is believed that glacial morainal deposits reached into the Little Blue Valley in the area of Fort Osage. Since the retreat of the Kansan glaciation, the Missouri River has drained most of the Great Plains which is presently flowing in alluvial deposits that are over 40 m deep. At the mouth of the Little Blue alluvial deposits are nearly 30 m deep and are over 20 m deep near the axis of the dam on the East Fork. So these rivers are all flowing in valleys that were once much deeper.

The continental glaciation was accompanied by the redistribution of sediments by winds. These sediments are primarily silt sized particles called loess. Loess deposits are generally the thickest along the uplands of modern stream valleys.

The latest glaciation, the Wisconsinan, may have had an effect on the preservation of Paleo-Indian age artifacts dating to ca. 12,000 B.P. Since

loess covers most of the upland surfaces in the area and is believed to be at least 12,000 years old, loess surfaces could contain human artifacts. Accumulating evidence indicates that minor events of loess deposition may have occurred during prehistoric and recent historic times. In certain areas soil formations in older loess have been truncated and buried by more recent loess deposition.

Loess does not cover all the upland and hillside surfaces; bedrock crops out almost continuously throughout the length of the Little Blue valley. Regoliths of weathered bedrock occur on the hillsides. In these areas of high relief the rates of erosion and deposition are greatest. Upland loess washes off the valley walls and fills in the base of the valley as flood plain deposits. These flood plain deposits are primarily silts and clays from the weathering of shales and from the reworking of loess (McCourt 1917). Some sands and gravels are incorporated into the valley deposits as channel gravels or as colluvial deposits near the valley walls. Areas of colluvial deposition have high rates of deposition and are known to bury archaeological sites (Gardner 1980:59). Conversely, the upland and upper hillside surfaces are areas of active degradation.

The unconsolidated deposits which make up the valley bottoms are late Pleistocene to Holocene in age. The majority of these sediments result from primary deposition of loess and the reworking of loess into overbank alluvial deposits. These alluvial deposits show several surfaces or terraces which indicates cyclical periods of valley aggradation and degradation. Figure 10 shows the location of these terrace surfaces in the area of Blue Springs Lake. The lowest and youngest terrace is called the T-0 terrace and refers to the slightly elevated ground (1-2 m) immediately adjacent to the modern channel. From this surface there is a moderate to steep slope up to the T-1 terrace surface. This surface is about 4-5 meters above the present channel and is fairly extensive throughout the valley. Portions of this surface are modified by abandoned channels and recent gulleys. Areas of the T-1 surface are poorly drained while other areas have been buried by colluvial material. An older T-2 terrace has been identified in some of the small protected tributary valleys. One valley along the East Fork of the Little Blue produced an area considered to be a T-2 terrace. Here the smooth sloping surface is well above the T-1 surface and has been dissected by creeks with lower base levels.

The terraces at Longview Lake are less developed and poorly preserved due to the shallow depth of bedrock, actively migrating channel and decreased width of the valley. Consequently, they have not been investigated in detail.

Figure 11 shows a diagramatic cross-section of the geomorphology of the study area. It is a compilation of published and unpublished data and field investigations. The superficial deposits vary with the surfaces themselves. Basically, there are three different surfaces present in the area: upland surface, hillside surfaces (and those associated with rock shelters), and modern or relict surfaces on and in the flood plain deposits. The deposits that cover these areas include bedrock, soils weathered from bedrock, loess, colluvium and alluvium. Alluvial and colluvial deposits include particles reworked from all the other deposits.

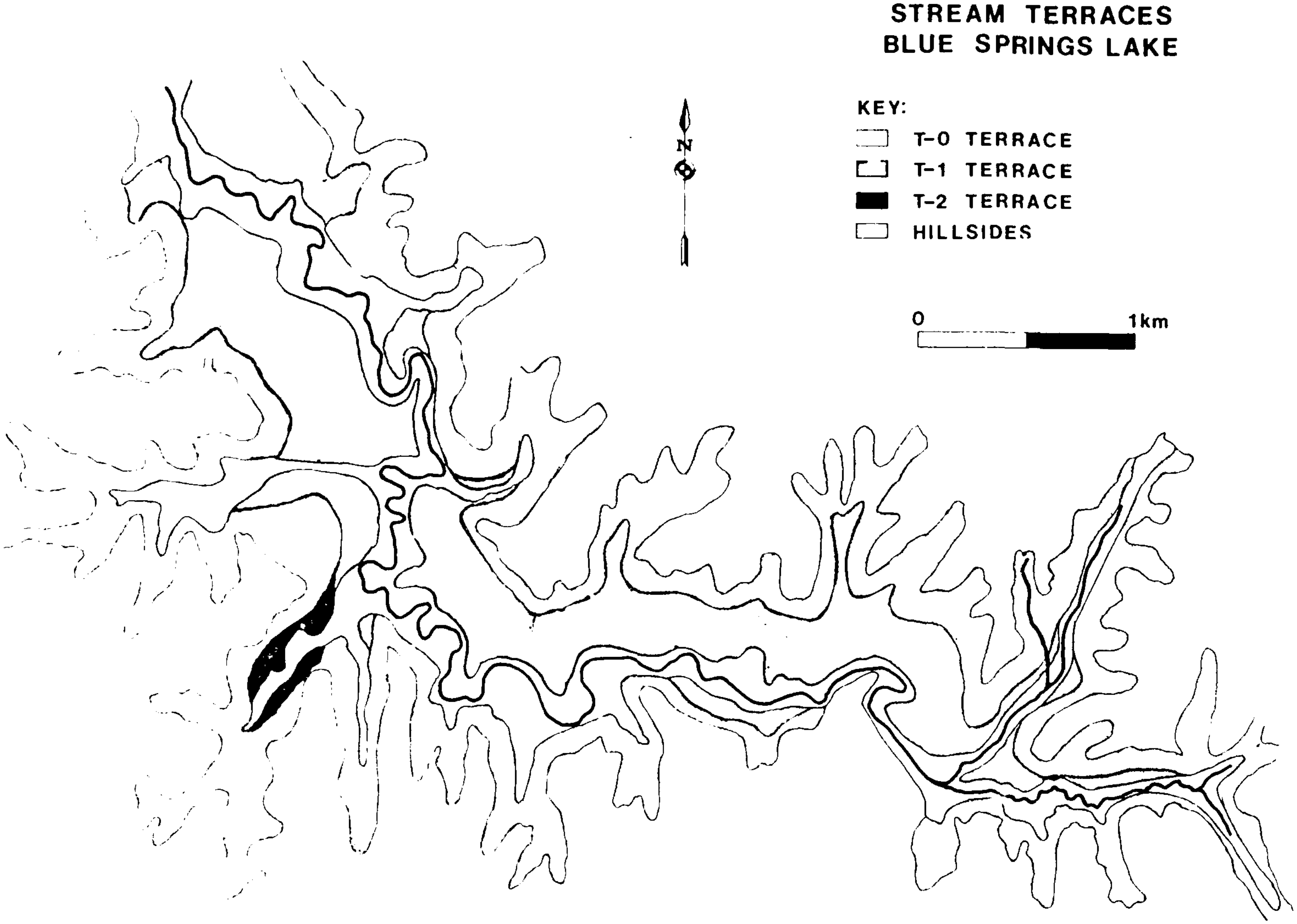


Figure 10. Stream terraces at Blue Springs Lake.

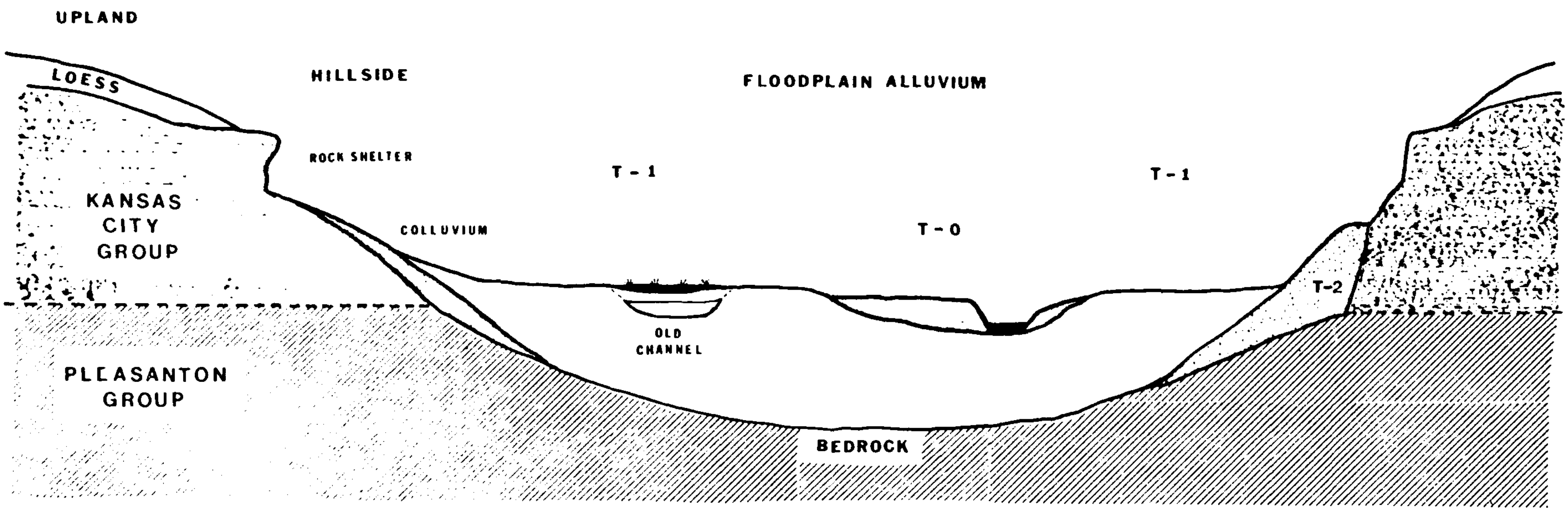


Figure 11. Geomorphic cross-section of Little Blue Valley.

Soils and Geomorphic Surfaces

Unfortunately, there have been no published soils maps for the Jackson County area that show the sufficient detail required for geomorphic evaluation. The present coverage utilized soil series now outdated in comparison to soil surveys available for adjoining counties. However, field sheets taken from aerial photos have been completed for part of Jackson County although they do not cover the Blue Springs and Longview study areas. The soil series known to occur in the Little Blue Valley are listed in Table 2, along with their relative positions on the different geomorphic surfaces.

Table 2. Soils of the Little Blue Valley.

Soil Series	Geomorphic Setting
Sibley Soil	Upland soil formed in loess
Snead Soil	Hillside soil formed from bedrock
Kennebec Soil	T-0 soil formed on flood plain alluvium
Colo Soil	T-1 soil formed in depressions on terrace
Zook Soil	T-1 soil formed in poorly drained areas of terrace
Bremmer Soil	T-1 soil formed on terrace
Weller Soil	Well drained soil higher topographically than the Bremmer soil, possible T-2 terrace

Upland Surfaces

The upland surfaces are underlain by the same group of rocks that compose the valley walls and are capped by either residual soils formed from these rocks or by variable thicknesses of loess. The length of time that a surface has been exposed varies tremendously on the uplands and hillsides because rates of degradation and aggradation can be inferred only in a general sense. It would be reasonable to expect that a topographically high area would be losing sediments by gravitational forces and rainfall erosion. However these surfaces may have received deposition from wind transported particles and from the decay of plants. The location of artifacts below the Ap horizon (plow zone) at 23JA170 and 23JA35 indicate that parts of this surface has been aggrading. Bioturbation and other pedoturbation may explain the burying of artifacts in other parts of the country, but there has been no research on rates of turbation in this area.

The general upland surface is composed of loess that was probably stabilized by soil forming processes. Subsequent localized degradation has stripped the upper soil horizon off and carried these silts laterally and down slope to aggrade other portions of the uplands, to mix with colluvial material on the hillsides, and to augment valley alluvial deposits. In the major upland sites (23JA35, 23JA170) the matrix material of the sites was composed of well structured silts whose original A- and B-horizons were removed.

Hillside Surfaces

The hillsides along the Little Blue River are moderate to steeply sloping surfaces composed of very shallow soils forming on weathered bedrocks of the lower Kansas City Group and the Pleasanton Group. Many of the sites found on these hillsides are in association with natural rock shelters formed in the Bethany Falls Limestone. The surfaces below the rock shelters topographically slope down to the flood plain and are covered by coarse colluvial material weathered from the bedrock. Excavations and back-hoe trenches into the hillside at 23JA9 show an apparent lack of cultural material below this surface. This suggests that these surfaces are much older than the ages of known inhabitants of the region. The thin soils of the Snead series attest to the lack of soil horizonation and sediment accumulation. In the Longview Lake area the valley is narrow and the hillside surfaces are on rocks that are above the Bethany Falls Limestone. This would include the Winterset Limestone, and weathered regoliths of chert would therefore be more common here than at Blue Springs Lake.

The hillside sites along the East Fork (23JA37 and 23JA9) are clearly associated with the rock shelters and flood plain surfaces. At Longview Lake these overhangs are not as prominent, although there is a stronger association of sites to upland surfaces. These hillside sites show the least effect of cultivation by man since many of these surfaces continue to remain under woodland vegetation. The colluvial armoring on these surfaces tends to retard bioturbation although slopewash serves as a rapid transport mechanism down to the base of the slope. This surface can have a varied range of cultural material on it, and near the base of the slope there is the possibility that younger material could be buried by older material washing onto it from off the upland and hillside surfaces. This situation was noted near 23JA191 where older diagnostic material washed into a channel fill of younger age.

Flood Plain Surfaces

The flood plain surfaces contain the most complex series of deposits and soils within the study area. It is in these alluvial deposits that most of the archaeological sites are located and where almost all the radiocarbon dates were obtained. Within the study areas over 20 samples of carbon were radiometrically dated. Their locations and geomorphic provenience have been carefully documented to determine the chronology of the alluvial deposits in the valley as they relate to both human occupation and inferred climatic changes.

Figure 11 shows diagramatically a cross-section of the valley fill sequence in the East Fork study. The flood plain surface contains a number of soil series that can be used to delineate the T-0 and T-1 surfaces. While soils themselves do not necessarily represent specific periods of time, the sediments upon which they are forming do. It is these sediments and surfaces which have been successfully dated by radiometric methods and by diagnostic cultural material. Together with the dates from the May Brook site (Schmits 1981), a chronology that spans at the past 8000 years has been developed (Table 3).

With the exception of cut and fill sequences and depressional soils, the T-1 surface appears to date from about 500 to A.D. 1. This indicates that the T-0 deposits are younger than A.D. 1. This surface continues to receive sediments during large scale rainfall events. The flood plain surface is locally characterized by depressional features representing former channels or drainage positions which are cut into by the T-1 deposits to some depth (Fig. 12). Organics suitable for dating were recovered from these depressions. Preservation in these depressions is good; plants are quickly covered by sediments.

The T-0 sequence is best represented by the deposits and chronology studied at site 23JA43 (Kopsick 1980). At this site a buried cultural occupation was located over a meter below the surface of the T-0 terrace which is characterized by the Kennebec soil series. This horizon dated at about 750 B.P. and was located below a buried soil horizon which dates to European settlement and farming practices beginning about 150 years ago. The oldest date came from near the base of the T-0 and was 1460±125 B.P. Since the actual intersection of the base of the T-0 and the underlying T-1 deposits was not reached, the 1460 B.P. date may be considered as a little young since the T-1 surface appears to date to about 2000 B.P. (A.D. 1).

Correlation of the T-1 Terrace

Prior to the geologic investigation of the alluvial materials in the Little Blue River valley, the only chronological information on flood plain surfaces was from archaeology. Sites located on these dispersed and discontinuous terrace remnants correlated with Middle Woodland or slightly older cultures. No cultural deposits much older were found on these flood plain surfaces. Materials from the modern flood plain surface (T-0) were generally historic, showing little antiquity.

Figure 13 shows four cross-sections of T-1 deposits at different points within the valley of the Little Blue. The one farthest up the valley is from the Sohn site (23JA110) investigated by Johnson (1978). Two radiocarbon dates from the site are superimposed on this section at presumed depths below the surface. Site 23JA155 produced the oldest dates that can be associated with cultural activity and are again superimposed on the profile. The profile at 23JA9 is from a very long trench with a single date in its profile. The section for 23JA164 is the farthest downstream profile and has not been dated.

Table 3 . Radiocarbon dates.

SITE	DATE B.P.	LAB NO.	DEPTH BELOW SURFACE	SETTING/SOIL
23JA43	150±80	DIC 1523	.7 m	T_0 Kennebec
23JA238-1	680±65	DIC 1603	2.9 m	T_1 Zook (fill)
23JA43-2	730±130	DIC 1526	1.1 m	T_0 Kennebec
23JA43-3	780±90	DIC 1522	1.3 m	T_0 Kennebec
11Sept-1	1100±75	DIC 1527	2.0 m	T_0 Kennebec
23JA191	1205±65	UGa 2977	2.7 m	T_0 Kennebec
23JA43-4	1420±125	DIC 1524	1.4 m	T_0 Kennebec
23JA238-3	1460±55	DIC	2.5 m	T_1 Colo (oxbow)
23JA238-2	1620±45	DIC 1680	.5-.85 m	T_1 Colo
23JA143-1	1620±70	DIC 1683	.54 m	T_1 Zook
23JA40a	1850±140	UGa 2350		T_1
23JA110a	2220±195	DIC 914	.2 m	T_1 Bremmer
23JA40b	2300±110	UGa 2351		T_1 Bremmer
23JA159a	2345±70	UGa 2535	.4-.5m	T_1 Bremmer
23JA36	2400±85	UGa 1873		T_1 Bremmer
East of 23JA164	2400±65	DIC 1604	2.1 m	T_1 Colo (fill)
23JA159b	2455±80	UGa 2404	.4-.5 m	T_1 Bremmer
23JA110b	2970±490	DIC 913	.3-.4 m	T_1 Bremmer
23JA9	4120±195	DIC 1682	1.6 m	T_1 Bremmer
23JA155-3	4180±95	DIC 1679	2.2 m	T_1 Bremmer
23JA155-2	4540±150	DIC 1678	2.9 m	T_1 Bremmer
23JA38	4550±115	BETA 1873	.3 m	Upland Surface
11 Sept-2	8060±90	DIC 1569	7.1 m	T_1 Bremmer

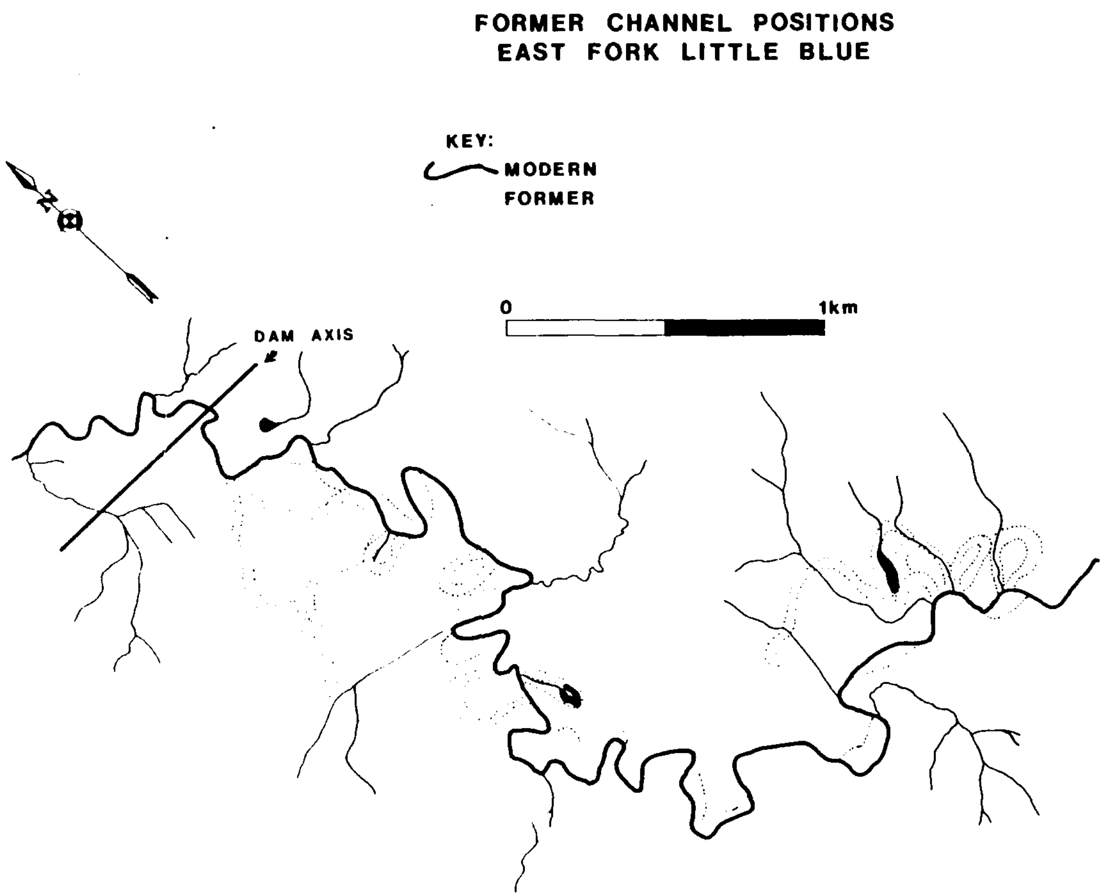


Figure 12. Former channel positions on East Fork Little Blue River.

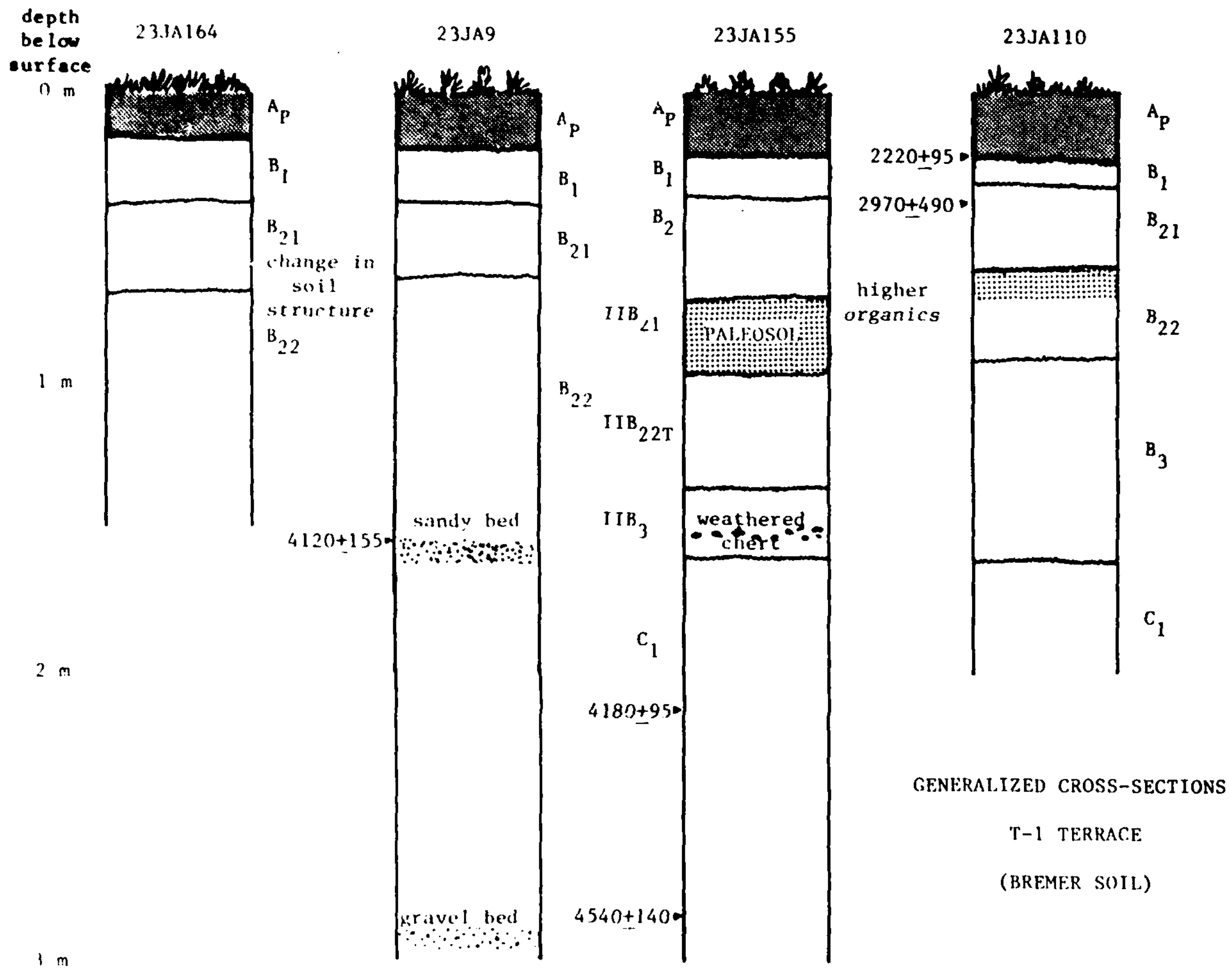


Figure 13. Selected Soil Profiles in T-1 Terrace.

These profiles are from surfaces mapped as the Bremmer soil. The most distinctive feature that was noted within the T-1 terrace, aside from the cultural component at 23JA155, was the presence of a paleosol (buried soil horizon) at 1.1 m below the surface of 23JA155. It was thought that this paleosol could be found in other T-1 deposits at similar depths, but no true paleosol could be found outside of 23JA155. However, there are sufficient similarities in the other profiles at the depth in question to suggest that a paleosol or another type of stabilizing event was present. The soils data from the Sohn site (Table 4) show a definite high value for organics at about the same depth below the surface. This type of organic concentration is typical of a buried soil horizon. It is interesting that Johnson and Miller did not notice any organic accumulation in their soil profile. At 23JA155 where the profile showed an organic accumulation, the soils analysis did not pick up any increase in organics (Table 4). A possible explanation for the

Table 4. Chemical characteristics of profiles at the Sohn site (23JA110) and Cold Clay (23JA155).

Depth (cm)	Organic matter percent	pH	$CaCO_3$	Depth (cm)	Organic matter percent	pH	$CaCO_3$
0-20	1.6	6.3	N/A	10	2.6	6.6	----
20-40	1.2	6.9	N/A	35	1.4	6.8	----
40-60	1.2	7.1	N/A	50	1.2	6.6	----
60-80	1.6*	7.1	N/A	60	1.2	6.7	----
80-100	1.2	6.9	N/A	80	1.0	6.3	2000
199-120	1.3	6.8	N/A	100	0.9	6.2	2000
120-140	1.2	7.0	N/A	120	0.8	6.3	1500
				140	0.9	6.3	1500
				160	0.6	6.4	----
				180	0.4	6.6	----
				200	0.6	6.5	----
				220	0.5	6.5	----
				240	0.5	6.6	----

apparent discrepancy in data may be found in the fact that the excavation at 23JA155 was open for a very long period of time (90 days) giving the surface of the trench more time to exhibit the subtleties of the paleosol. Trenches at 23JA164, 23JA9 and presumably 23JA110 were probably not exposed aerially for long time periods sufficient to show the paleosol. All the profiles show a break in the soil profile near this depth and record a change in soil structure, again indicative of similar soil horizons developing at all four sites. Another feature that would substantiate the antiquity of the paleosol at 23JA155 was the increase in $CaCO_3$ at precisely this depth. $CaCO_3$ concentrations have been used in other areas to identify older soil horizons.

At about 1.5 m below surface at 23JA9, carbon was retrieved from a coarse sand layer within the T-1 deposit. The coarse material probably implies greater intensity rainfall washing coarser material off the hillside. This depth in the profile of 23JA155 is characterized by a thin layer of weathered chert. Chert of this kind is present in the regoliths of Winterset found near the uplands of this site, and the best way to disperse this chert is to erode it off the hillsides. To do this so evenly as mapped in the profile of 23JA155, a high intensity rainfall event would be required. Since the trenches at 23JA164 barely penetrated this depth, no data was obtained to test this theory, but the profile at 23JA110 does show a change in soil horizon from B-3 to C-1 at this depth.

The two dates above and below the cultural level at 23JA155 cannot be correlated with any of the other profiles. The only similarity that exists is lithology. Below two meters in almost all of the T-1 profiles, the material is a mottled mixture of silts and clays with apparently little soil structure and hardly any layers or stratification.

The oldest date for T-1 sediments is from the sewerline trench near the dam axis along the East Fork of the Little Blue. It was recovered about seven meters below the surface of the T-1 and dated at 8060±90 B.P. (DIC 1569). To determine relative rates of aggradation in the valley, one can subtract a known date and depth from our maximum date and depth. This results in a value of about one meter of deposition for every 870 years or 11 m per year. Naturally the erosional/depositional sequence is much more complex, but this provides some information regarding rates of aggradation for the T-1 terrace.

The next oldest dates are from three meters below the T-1 surface at 23JA155. Both are associated with cultural features and artifacts. The fact that Archaic material can be found buried several meters below the T-1 terrace surface is supported by two other C-14 dates (4180±95 and 4129±195) on non-cultural carbon at depths of 2.2 and 1.6 m below the surface.

The rest of the dates from the T-1 deposit range in time from roughly 3000 to 2000 years B.P.. These samples are from hearths and from charcoal located 20 to 50 cm below the surface. The high number of Woodland aged cultural sites located on the T-1 terrace surface indicates that the T-1 surface was building up during Archaic times burying the majority of the pre-Woodland sites located on the flood plain. Deposition on the T-1 surface must have slowed or stopped around 2000 years ago since Woodland sites are not buried.

Buried sites of cultures that are less than 2000 years old obviously can be found only in sediments that are less than 2000 years old. These deposits are located in two general areas, the T-0 terrace deposits and in depressional fill sequences on the T-1 surface. The stratigraphic and cultural sequences which best define this part of the alluvial chronology are located at May Brook,a small tributary to the main trunk of the Little Blue, and in a channel fill exposed along a cut bank of the East Fork.

The May Brook site (23JA43) has produced four C-14 dates and the second site (23JA238) has three C-14 dates. These dates indicate that following the stabilization of the T-1 surface during Woodland times, the Little Blue River began incising its channel. This incision cut off several meander loops leaving them as depressions on the T-1 surface. These former channel positions provided sheltered areas from the sun and winds and were the logical pathways from the T-1 surface to the creek. Being low lying areas, they were subject to flooding by the creek during high flows, and to erosion and deposition associated with the draining of water off the T-1 surface. At 23JA238, the former channel filled in rapidly, burying the remains of occupation of the depression. One such occupation dated at 1460 ± 55 B.P. was obtained from a depth of 2.5 m below the top of the fill.

At about the same time the channel at May Brook was already laying down T-0 deposits. Aggradation of the T-0 deposits continued to the present. Excavations at 23JA43 document the burying of a midden dated at about 750 years B.P. and a paleosol dated at 150 ± 80 B.P.. This paleosol and the sediments that cover it represent deposition since Euro-American agricultural practices disrupted the natural vegetation. The sediments above the 150 year old soil horizon are referred to as "post settlement alluvium".

By combining the geologic, archaeologic and radiocarbon data it is possible to reconstruct the chronology of events in the Little Blue Valley for at least 8000 years. However, there are a number of complications and physical restrictions that need to be understood before the model can be applied throughout the Little Blue Valley or in adjacent valleys. Deposition has not been constant in the major valley fill. This can be seen in the numerous abandoned channels and depressional areas that cover parts of the surface In these cut and fill sequences, at depths down to three meters below the surface, charcoal has been dated at only 680 ± 85 years B.P.

The integrity of similar landforms throughout the study areas can be questioned by simply making cross sections through the alluvial deposits at various points in the valley. As we see in Figure 14, there is quite a bit of difference in the total area of these deposits depending upon where you look at them in the valley. Therefore our simple model need not apply to other valleys nor even within its own valley.

These problems arise when the problem is considered only in the two or even the three dimensional sense. Landforms evolve with time, and at any one point in time the surface of the ground can reflect numerous physical conditions and/or several periods of time. For example in a stream valley at 3000 years ago, the channel bed at the mouth of the stream begins to erode downward, the effects of incision will be felt first in the region around the mouth of the channel. In particular, the former flood plain surface will now be left as a terrace surface as of 3000 years ago. However, depending upon geologic

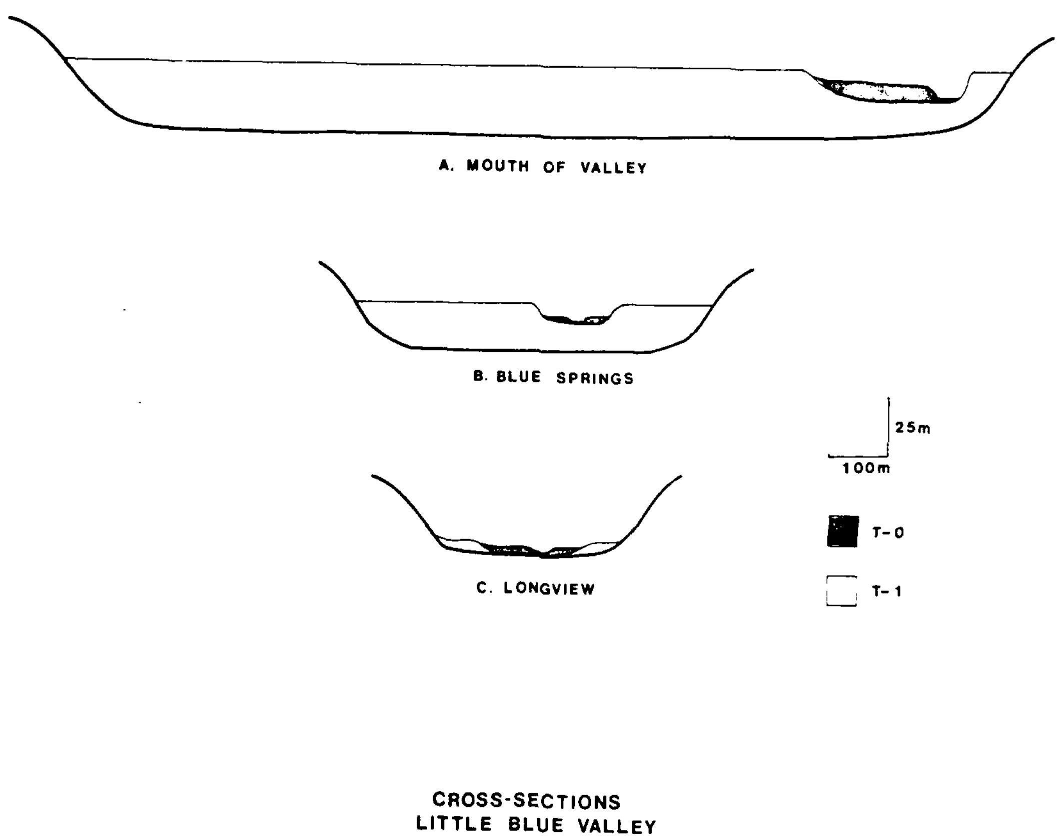


Figure 14. Map of terraces on East Fork Little Blue River.

controls in the bed of the channel, it may take relatively no time at all or it may take tens or hundreds of years for the response to downcutting to be felt in other parts of the valley. In essence, the 3000 year old terrace surface in the downstream part of a valley can be mapped as a continuous unit with the same terrace surface that is only 2500 years old in another part of the valley. The geologic term for this phenonmena is that the terrace surface is time transgressive: the surface corresponds to a certain range of time.

Another geomorphic consideration is that processes are not occurring at similar rates throughout the valley. Rates of sedimentation depend on various factors like sediment size, channel gradient, velocity, and drainage basin size. As you move upstream drainage basin size becomes smaller and smaller. At the same time the sediment size generally becomes larger. These factors are somewhat compensated for by increased gradient and velocity. In general the reaction of the stream channel in the uplands to events happening in the downstream reaches is much more subdued. Deposition may not be so thick nor erosion that deep. This fact can be demonstrated by comparing radiocarbon

dates of artifacts below the plow zones at the two different impoundment areas.

Just below the surface of the terrace on the East Fork Little Blue River there are several sites which date to roughly 2200 ± 100 B.P. No Nebo Hill type artifacts have been found in these alluvial deposits. However, in the Longview Lake area in the same terrace and soils type there is evidence of Nebo type artifacts near the surface of this deposit. The radiocarbon date of 2970 ± 490 for just below the plow zone at site 23JA110 could be interpreted as showing the variation in rates of erosion and deposition on a similar terrace surface as one moves upstream from the mouth of the Little Blue River. Actually the rate of deposition about 3000 years ago is undocumented in other parts of the Little Blue, and would indicate that there was very little deposition during this time. If there was only minor deposition in the downstream reaches there would be even less in the upstream reaches and this period of time may even be evidenced by an erosion surface.

By examining the radiocarbon dates from geomorphic research on the main stem Kansas River it becomes apparent that the period just before 2500 B.P. was a period of erosion on the main stem rivers and subsequent incision on the tributaries (Kopsick: unpublished data). This might be considered as a ponse to a subhumid or humid climate condition following the Hypsithermal. cer about 2500 years ago, the main stem channel of the Kansas River stopped eroding its bed and began to migrate laterally as it built up its banks. The erosion in the main stem caused erosion of the tributaries and the formation of the major terrace surface. Deposition in the main stem rivers following about 2500 years ago halted downward erosion of the tributaries, at which time they proceeded to erode laterally sending sediments into the main stem valleys. This lateral migration in the tributaries resulted in the formation of the modern flood plain and the T-0 terrace.

It is not known just how long it took for the latest events on the main stem rivers to show up as geomorphic changes in the smaller valleys. Our best information on this comes from excavations and radiocarbon dates at 23JA43 on May Brook (a small tributary to the Little Blue). Here the T-1 terrace surface shows Woodland age artifacts and T-0 deposits contain a post- Woodland component buried more than a meter below the surface. Stratigraphy at this site included several gravel layers indicating former channel positions and a paleosol which dates to historic times. Above the paleosol are silts and clays that are considered to be post-settlement alluvial deposits. The oldest date from the T-0 deposits is 1420 ± 125 B.P.

In conclusion, if we understand the limitations of looking at geomorphic features through time we can use the following general model. In high order drainage basins that flow into the Kansas and Missouri Rivers, there are at least two distinct topographic surfaces or terraces visible. The number of surfaces and ages of these surfaces vary depending upon geographic position and geologic control within the valley. In general, however, where there is a modern flood plain (T-0) and a single step up to a terrace surface (T-1), the T-1 surface dates to about 2000 years B.P. The T-0 deposits are therefore about 2000 years old at their bases and get progressively younger toward the surface.

The regional application of this model to locating buried sites in similar tributary valleys is borne out by a simple examination of the soils in these different valleys. Under the most modern classifications, soil types on the T-0 and T-1 surfaces will be the same from one valley the next. This might indicate a regional response to climate and fluvial activities in this part of the Midwest.

CHAPTER VI

BIOTIC RESOURCES OF THE LITTLE BLUE VALLEY

David H. Jurney, Jr.

INTRODUCTION

In this chapter we discuss the plant and animal resources available to prehistoric and early historic groups in the Little Blue River Valley. Native animal populations are generally dependent on the native vegetation of an area, which is in turn determined by the general physiography, climate, and soils of the area. We therefore briefly discuss here the general physiography, climate, and soils of the Little Blue Valley to develop a basis for our discussion of the native vegetation. Native vegetation is described as it existed before European settlement disruptions, with most of this description based on our interpretation of the documentary records of the Federal Government Land Office Surveys conducted in the early and middle nineteenth century.

The Land Office survey information is used, in conjunction with physiographic and soils data, to construct a model of the pre-European settlement vegetation involving seven resource zones. In a final section in this chapter, we describe these resouce zones in terms of their dominant vegetation and associated animal communities.

GENERAL PHYSIOGRAPHY

The Little Blue River Valley lies midway between the Ozark Plateau and the Great Plains in the intervening prairie region of west-central Missouri known as the Scarped Plains or Interior Lowlands (McCourt 1917; Schoewe 1949). Erosion of the underlying rocks of this region has produced a series of plains and escarpments that trend northeast and southwest and a general surface of rolling uplands with typically dendritic drainage systems emptying north into the Missouri River. The upland elevation is 332 m along the drainage divide between the Little Blue and tributaries of the Osage River, which flow southeast. Elevations of the Missouri River bluffs range from 274 m to 305 m above sea level.

Lowland areas consist of the 3.2-8.0 km wide Missouri River trench and the main tributary valleys of the Big Blue, Little Blue and Sniabar Rivers. These flood plains have been incised into 46 to 91 m of bedrock (McCourt 1917:10). The Little Blue River originally flowed eastward through the valley now occupied by Fire Prairie Creek (Fig. 1), but was captured by a steeper, more direct gradient cut northward through the uplands during Pliestocene gla-

ciation. Shifting sand dunes and the underfit drainage within this abandoned valley apparently contributed to the existence of a large lake, extensive marshes, and lowland prairie in this area (McCourt 1917:15).

CLIMATE

The contemporary climate of west-central Missouri is marked by seasonal extremes in temperature and rainfall. Average annual temperature is 12.8° C, and a mean high of 17.8° C (United States Department of Commerce 1977). Based on the U.S. Department of Commerce Weather Bureau records (1889-1979), the warmest months are July, August, June, and September and the coldest months are January, February, and December. Five year running means derived from this record indicate that average temperatures periodically fluctuate as much as 6° C in February to a minimum of 2° C in September (Fig. 15). Freeze data derived from the 1916-1935 period indicate that a 50 percent chance of a spring killing frost exists until April 5, with a 50 percent chance of a fall killing frost as early as the 30th of October (Decker 1955). Similar data for the period 1890-1910 indicate that the growing season was shorter then, with average spring killing frosts occurring until April 10, and fall frost as early as the 23rd of October. The average 1890-1910 growing season was 195 days, while the 1916-1935 growing season was 208 days.

Annual precipitation in the Kansas City area averages 90 cm, more than 75 percent of which falls during the growing season. Data for the 1889-1979 period indicate that most precipitation occurs the months of May, April, August, July, June, September, October and March. The least amount of precipitation occurs during the months of November through March. As indicated by five year running means (Fig. 15), average precipitation fluctuates most dramatically June to September, with a maximum fluctuation of 12.2 cm in July and a minimum of 2 cm in December.

United States Geological Survey surface water records for the period 1948-1978 indicate that water discharge in the Little Blue Basin is highly variable. Generally, peak discharge occurs in the spring during April and June and is lowest during the months of August and November through March (Fig. 16).

SOILS

Detailed soil surveys have been completed for only portions of the Little Blue Valley by the U.S. Soil Conservation Service. At least seventeen soil series have been mapped in this area within three general physiographic divisions, bottoms and terraces, slopes, and uplands (Table 5). Soils are discussed from a geological standpoint, particularly as an indicator of terraces, in the preceding chapter. In this section soils are considered as indicators of the type of vegetation in place during their development.

Lowlying flood plain soils developed under both prairie and forest vegetation. Although most flood plain soils are relatively recent in their

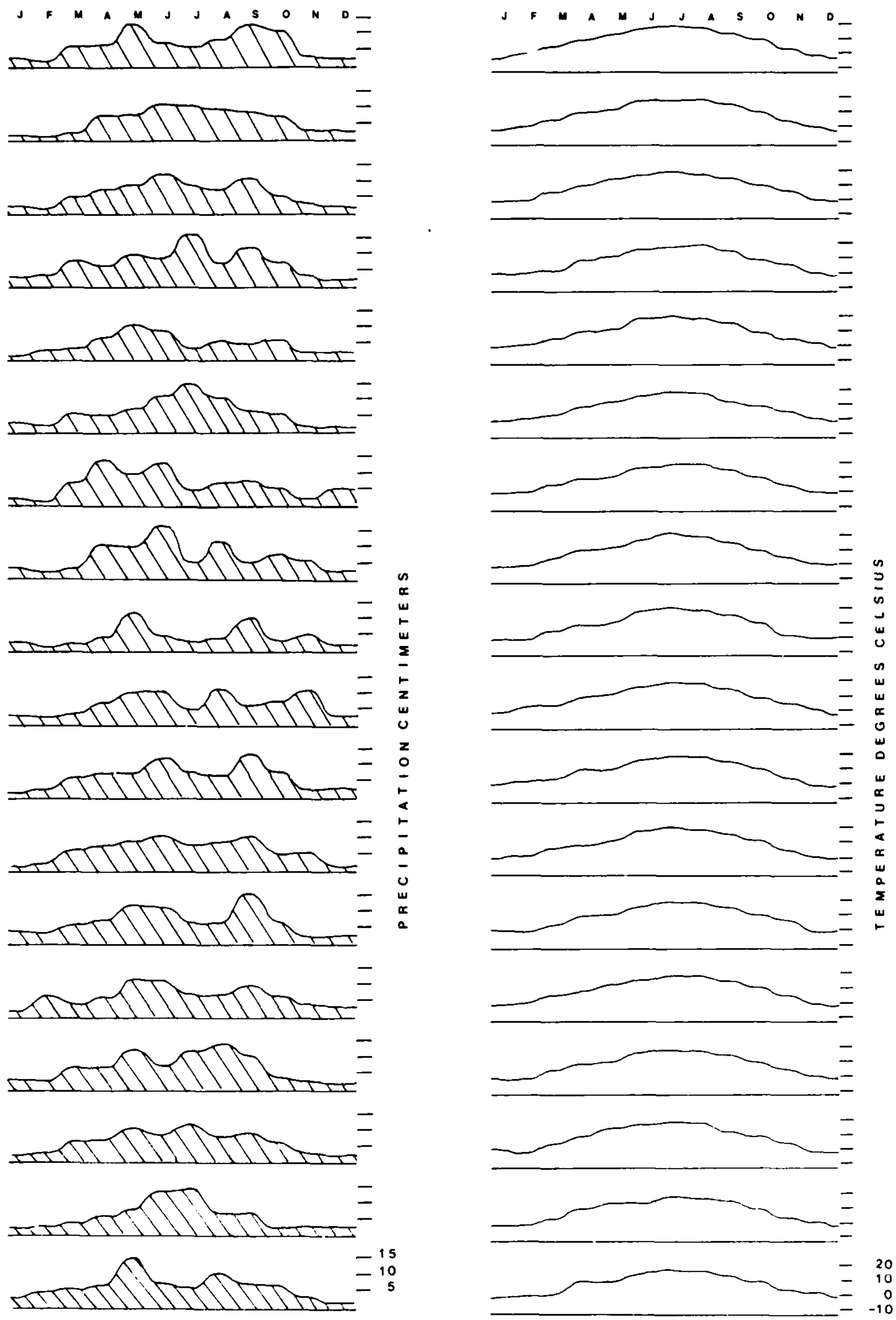


Figure 15. Precipitation and temperature for Little Blue Basin shown as five year running means.

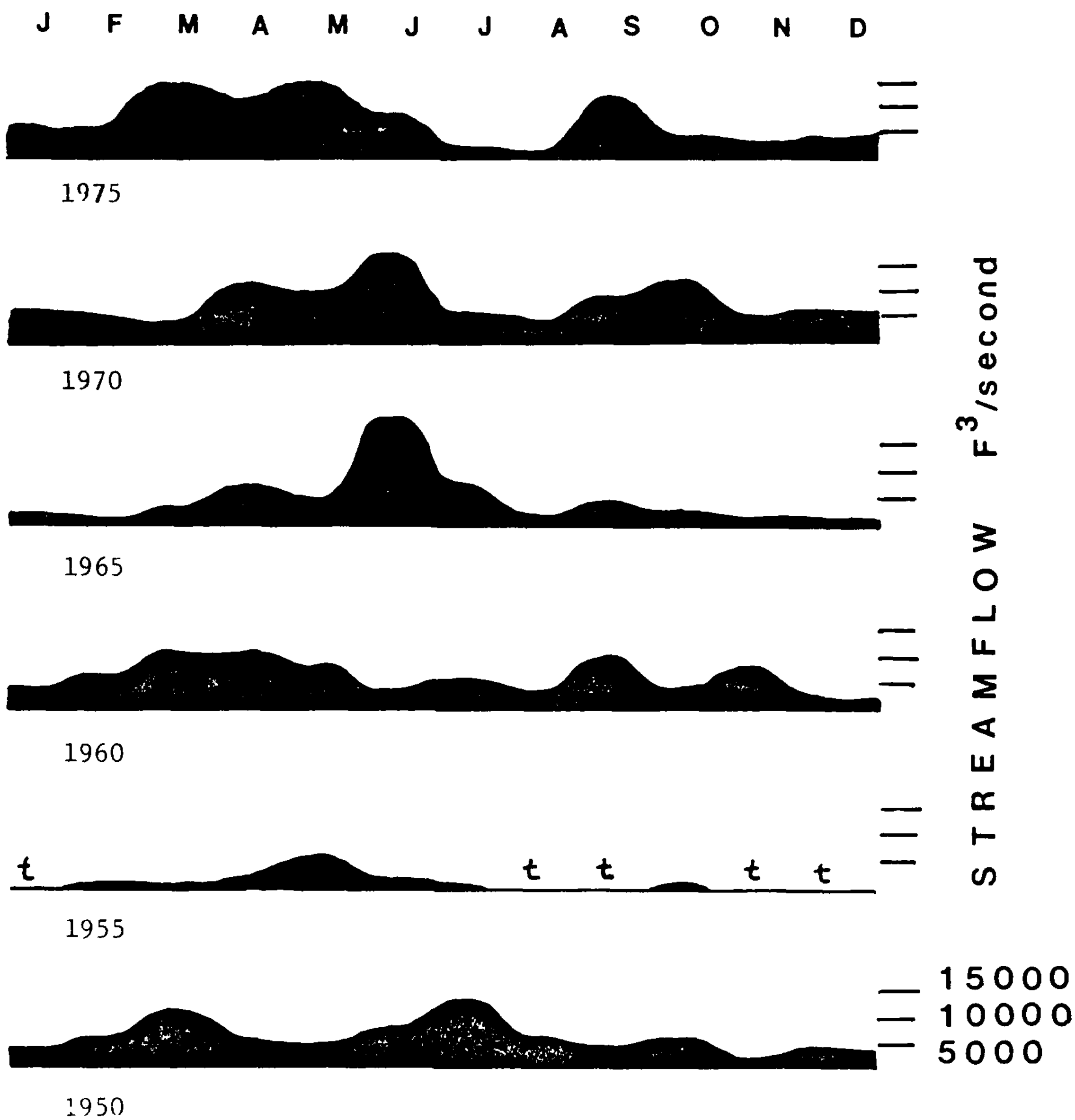


Figure 16. Stream flow for Little Blue Basin shown in five year running means. Symbol "t" represents "trace".

Table 5. Distinguishing features of mapped soil series in the Little Blue River Valley.

Soil Series	Distinguishing Features
Bottom soils:	
Zook	Poorly drained under prairie on floodplains
Kennebec	Moderately drained under prairie on floodplains
Colo	Poorly drained on floodplains
Wabash	Very poorly drained in low areas on large floodplains
Wiota	Well-moderately well drained a few feet above floodplains
Bremmer	Poorly drained on low stream benches and high bottomlands
Slope soils:	
McGirk	Somewhat poorly drained in local colluvium and alluvium on footslopes
Snead	Moderately well drained in clay shale and limestone residuum on hillsides
Slope-Upland soils:	
Sharpsburg	Moderately well drained in loess under prairie on upland divides and stream benches
Knox	Well drained in thick loess on strongly dissected river hills and bluffs
Weller	Moderately well drained under forest on loess uplands and sideslopes
Menfro	Well drained in loess on ridgetops and sideslopes
Upland soils:	
Sampsel	Somewhat poorly drained in shale residuum on uplands
Martin	Moderately well drained in clay shale residuum on uplands
Sibley (Marshall)	Moderately well drained under prairie on loess uplands
Macksburg	Somewhat poorly drained in loess under prairie on upland divides
Oska	Well drained in limestone and shale residuum on uplands

development, the Bremer series is a bottom terrace soil of greater age. Archaeological sites were often found in this soil. Slope soils developed (in loess, colluvium, and alluvium on hillsides, bluffs, and benches) under both prairie and forest vegetation. Upland soils developed (in loess and shale and limestone regolith) mainly under prairie, with some forest lining the bluff edges (Fig. 17).

VEGETATION

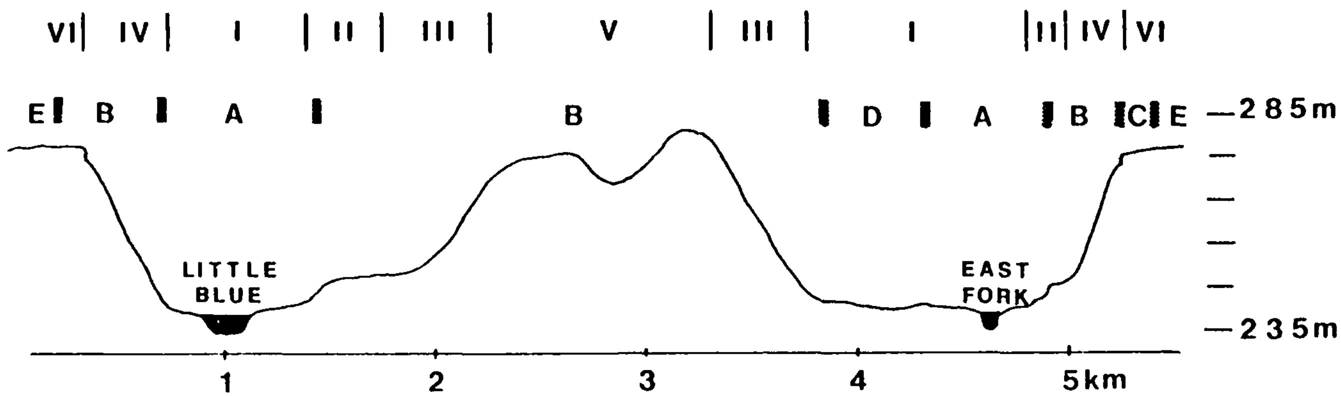
The native vegetation of the Little Blue basin is transitional between prairie and forest biomes and is characterized by extensive edge environments whose positions fluctuate in response to major climatic changes. Historical activities such as agriculture, settlement and urban development have had great impact on native vegetation, and very few areas remain that retain the pre-settlement vegetation of the region.

To control for bias introduced by historical activities, the U.S. General Land Office (GLO) Surveys have been used in several states during the last few decades to reconstruct the general characteristics and distributions of forest and prairie vegetation that were present in the early nineteenth century (Bourdo 1956). Surveyors made general observations on vegetation, and specifically identified trees at section and quarter section corners. These surveys provide qualitative data by which forest type distributions can be mapped and quantitative data on the composition and structure of forest types.

Minor climatic variations, edaphic factors, and culturally and naturally induced fires do limit the accuracy by which vegetation patterns can be projected into the past (King 1978; Wood 1976). Despite the fact that there are problems with such projections, the GLO records remain the only pre-settlement ecological data available for many localities. As indicated by Bryson and Wendland (1967), the known departures of forest borders from recent positions indicate that from Atlantic time (ca. 5000 B.P.) on, climatic change was minor. Major vegetation zones present on the pre-settlement landscape would thus represent basic vegetational patterns for at least the past few millenia.

Several studies have been conducted in Missouri using the General Land Office (GLO) records to reconstruct vegetational distributions. Howell and Kucera (1956) used all quarter section and section corner trees to map the vegetation of Clark, Boone, and Dade Counties in northeast, central, and southwestern Missouri. McMillan (1976) also used all the quarter section and section corner trees to reconstruct the vegetation in two townships in the vicinity of Rodgers Shelter in the Ozark Highland. Baumler (1976) used a 30 percent sample of 12 complete and 11 fragmentary townships to generate a computer model based on cumulative percentages for Jackson County and portions of Clay and Cass Counties.

Unfortunately, the Baumler (1976) study is not comparable with the other Missouri studies because of the sampling procedure and the inclusion of line trees and meander post trees in the quarter section and section corner data.



SOIL SERIES

I. Zook, Colo, Wabash, Kennebec

II. Bremer, Wiota

III. Weller, McGirk

IV. McGirk, Snead

V. Weller, Menfro, Knox, Sharpsburg

VI. Sibley, Macksburg, Oska

VEGETATIONAL ASSOCIATIONS

A. Floodplain Forest

B. Slope-Upland Forest

C. Barrens

D. Lowland Prairie

E. Upland Prairie

Figure 17. Cross section of the Little Blue Valley and its main tributary of the East Fork with environmental associations.

Line trees and meander post trees were recorded by the GLO Surveyors for both sides of major streams. Including these trees in a cumulative percentage statistical analysis increases the proportion of river bank adapted species in the species composition of the flood plain forest.

Although several of the above studies have produced interesting results, none have systematically examined the nature of the data base. As recommended by Bourdo (1956:757), an understanding of the conduct of GLO surveys, the proportion of data which the survey notes supply, and the sequences and circumstances of various surveys is necessary to interpret correctly the Surveys. By using the GLO Surveys in a critical manner, it is possible to generate data which indicate the density and composition of the pre-settlement forest cover and are more accurate than simple percentage tabulations used in previous vegetational reconstructions.

For the purposes of the present vegetational reconstruction, all the GLO Surveys for Jackson County were examined, the chronological sequences delineated, and individual surveyor biases identified and systematically controlled. Tree species composition and diameter and density data for 12 townships were derived for the area (Fig. 18). Natural and artificial phenomena such as fire patterns, tornados, roads, and historic settlement and subsistence practices were noted, all of which affected plant community composition and the General Land Office data base.

The U.S. General Land Office Surveys in the Kansas City area officially began in 1816 with the survey of the Ft. Osage Military Reservation and the Indian Boundary Line from the Missouri River to the Arkansas River. The sequence of surveys, Deputy Surveyors in charge, townships covered, survey dates, and the rate at which each survey proceeded are shown in Table 6. Those surveys undertaken from 1815-1834 were governed by the 1815 instructions of Edward Tiffin. The 1834-1855 surveys were governed by the instructions published in 1834 at Little Rock, Arkansas. The 1855 instructions were accepted as final practice and procedure.

Figure 18 shows the area of the present vegetation reconstruction. The 1819 surveys, performed north of the Missouri River, were internally consistent, with two bearing trees observed at each quarter section, two at section corners, usually one line tree each half mile, and two trees at meander posts on streams. The 1826 surveys were not consistent, and several townships and lines had to be resurveyed due to errors. Two of the 1826 surveyors, William Shield and John C. Sullivan, observed two trees at quarter sections and four at section corners. Distance estimations were provided for only two of the corner bearing trees. Talton Turner, however, observed two trees at quarter sections, and recorded direction and distance for trees at most, but not all, of his section corners. In 1826, line trees and meander trees were observed as in the 1819 surveys; however, line trees were sometimes omitted, and meander trees noted only on the lower sections of main tributary streams and the Missouri River. Turner further complicated his survey by running his lines at three different magnetic declinations, the reasons for which he failed to explain. Shields incorrectly ran Township 48N 32W and resurveyed it the following spring. He attributed his error to mineral deposits which deflected his compass.

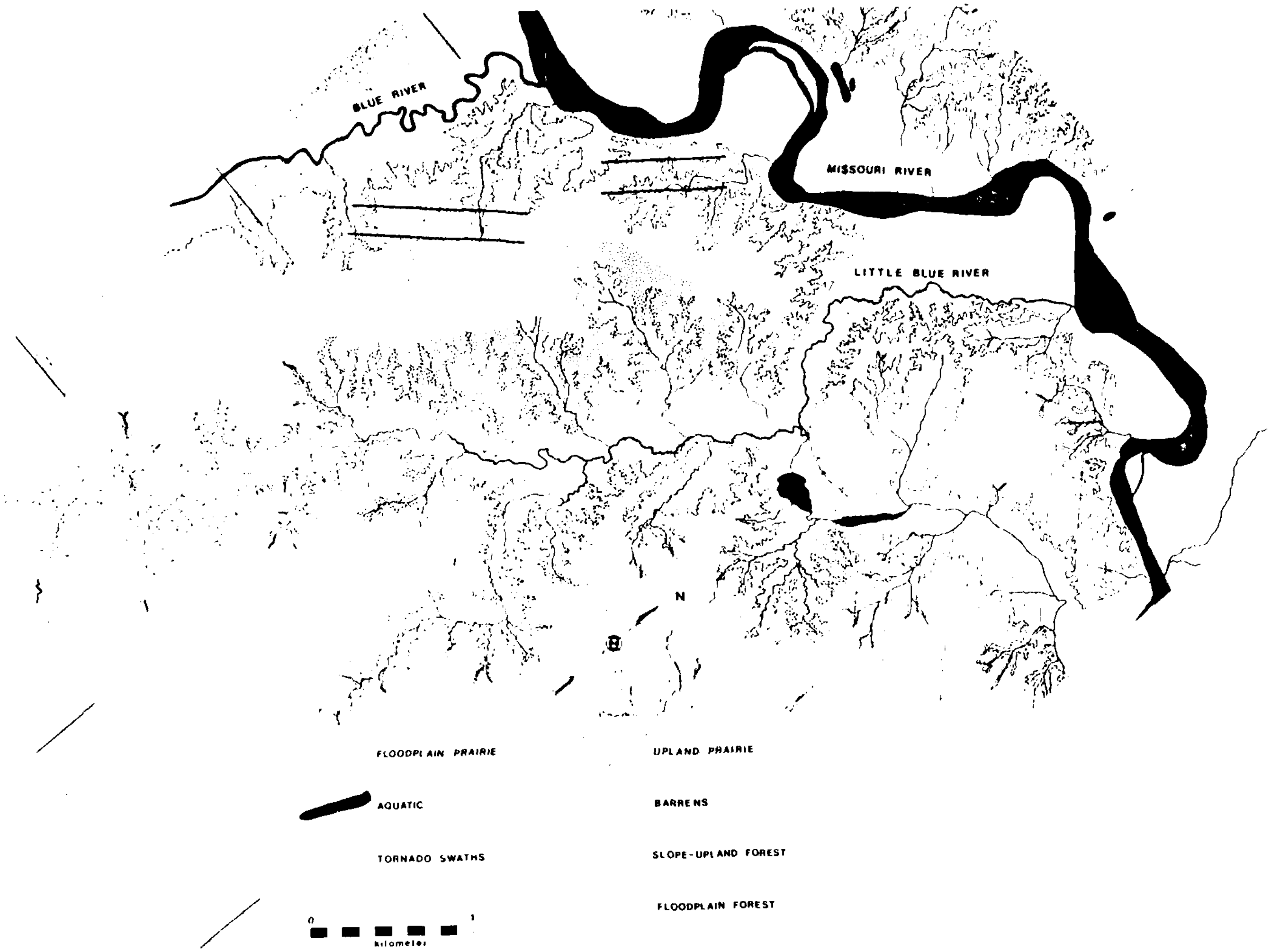


Figure 18. Vegetation zones of the Little Blue River Valley as represented in the 1826 General Land Office surveys.

Table 6 . General Land Office Surveys undertaken in the Little Blue region listing dates of the initial survey and subsequent subdivisional surveys. Exterior township lines surveys are excluded.

Deputy Surveyor	Survey Area	Dates	Miles Traversed	Miles/ day
Brown and Gamble	Indian Boundary	Aug. 18-Oct. 7, 1816	254.5	5.0
Brown	51N 30W	1819	81	-
Connor	50N 31W	1819	7	-
Connor	51N 31W	Mar. 20-Apr. 2, 1819	90	6.4
Powell	50N 32W	May 29-June 4, 1819	46	6.6
Powell	51N 32W	Jun 17-27, 1819	90	8.2
Turner	48N 30W	Sep. 15-30, 1826	90	5.6
Turner	49N 30W	Nov. 10-24, 1826	90	6.0
Turner	50N 30W	Nov. 24-Dec. 4, 1826	90	8.0
Turner	51N 30W	Dec. 6-9, 1826	20	5.0
Shields	48N 31W	May 10-17, 1827	90	11.2
Shields	49N 31W	Nov. 26-Dec. 10, 1826	90	5.6
Shields	50N 31W	Dec. 26-29, 1826 and Jan. 3-11, 1827	81	6.2
Shields	51N 31W	Dec. 30, 1826-Jan. 2, 1827	10	2.5
Sullivan	49N 32W	Nov. 1-9 and Dec 18-19, 1826	90	7.5
Sullivan	50N 32W	Dec. 20-28, 1826	25	2.8
Miller	48N 32W	Aug. 16-Sept. 8, 1843	90	3.6

For unexplained reasons, all the townships in the study area were not surveyed in 1826. William Miller subdivided the omitted townships in 1834, observing two trees at quarter section and four at corner posts. By this time, a large number of homes, farms, businesses, and roads had been constructed in the region, severely altering the native vegetation.

For our present study, two bearing trees from opposite quadrants at quarter sections and at section corners were selected from all subdivisional points of observation to provide quantitative data for tree stands in different environmental zones. This method also standardized sample sizes from each point of observation. The 1843 survey was treated separately as these data represent post-settlement disturbances to the original plant communities. A total of 1335 trees are represented in our sample.

In addition to these data, comments made by the surveyors indicate environmental processes that were occuring at the time. John Sullivan made several useful observations. He noted tornado tracks in Townships 49 and 50N, 32W (Fig. 18), which were never transcribed onto the plat maps. Also, when he was relocating the corners of 44N, 29W and 45N, 30W (the upland divide between the Sniabar and Osage River drainages) during October 1826, he observed: "the bearing trees at the intersection of the Standard Line with Osage Boundary are supposed to be burnt, as it is in the barrens where all the trees are much injured by fire and many burned down." At the end of each mile, the surveyors were instructed to comment on the vegetation and character of the land. These observations were often made from memory, and were sometimes omitted. Usually standardized lists of dominant plants served as surveyor comments. As these surveyors were covering an average of six miles a day, constructing quarter and section corner posts and raising rock and earth mounds, as well as marking all bearing trees, accuracy was undoubtely second to speed.

Figure 18 above depicts the stream courses and vegetational zones reconstructed from notes recorded by the GLO surveyors. Modern 7.5 minute quadrangle maps were used as a base for the bluff lines. During our process of reconstructing the vegetation zones, the GLO plat maps were drawn onto the modern quadrangles, and each subdivisional section line checked with the field notes.

The list of tree species used as bearing trees during the GLO surveys is presented in Table 7. Indirectly mentioned species and understory vegetation are listed also. The seven highest numerically ranked species of GLO bearing trees were selected for our analysis of the species composition and structure of the vegetational zones depicted in Figure 18 above. The species density and area per stem were used to calculate "importance values" often used in modern studies of forest composition . Density indices were derived by dividing the number of trees per species by the total of distances between each pair of points of observation. Area per stem was calculated by dividing the total basal area of each species by the number of trees of that species. Importance values were then produced by adding the density index and the average basal area for each species and dividing by two. The resulting importance values show dominant trees for each vegetational zone; these are graphically represented in Figure 19.

Table 7 . List of General Land Office bearing trees, understory vegetation and incidental species within the Little Blue basin vegetational zones.

Populus deltoides	cottonwood
Juglans nigra	black walnut
Carya spp.	hickory
Quercus alba	white oak
Q. macrocarpa	bur oak
Q. stellate	post oak
Q. bicolor	swamp white oak
Q. velutina	black oak
Q. palustris	pin oak
Q. rubra	red oak
Q. marilandica	black jack oak
Ulmus spp.	elm
Celtis occidentalis	hackberry
Morus spp.	mulberry
Plantanus occidentalis	sycamore
Pyrus augustifolia	wild crab
Crategus spp.	hawthorn, red haw
Ostrya virginiana	hop hornbeam, ironwood
Prunus serotina	black cherry
Gymnocladus dioca	Kentucky coffee tree
Gleditsia L., Robinia	locust
Cercis canadensis	red bud
Acer spp.	maple
A. saccharum	sugar maple
A. negundo	box elder
Aesculus glabra	Ohio buckeye
Tilia americana	basswood, linden
Fraxinus spp.	ash
Juniperus virginiana	eastern red cedar
Salix spp.	willow
Quercus falcata	spanish or cherrybark oak
Juncus spp.	rush
Smilax spp., rubus spp.	"briars"
Corylus americana	hazelnut
A. sminia triloba	pawpaw
Zanthoxylum americanum	prickly ash
Rhus spp.	sumac
Parthenocissus, Vitis spp.	"Vines"
Cornus spp.	dogwood
Cornus obliqua	swamp dogwood

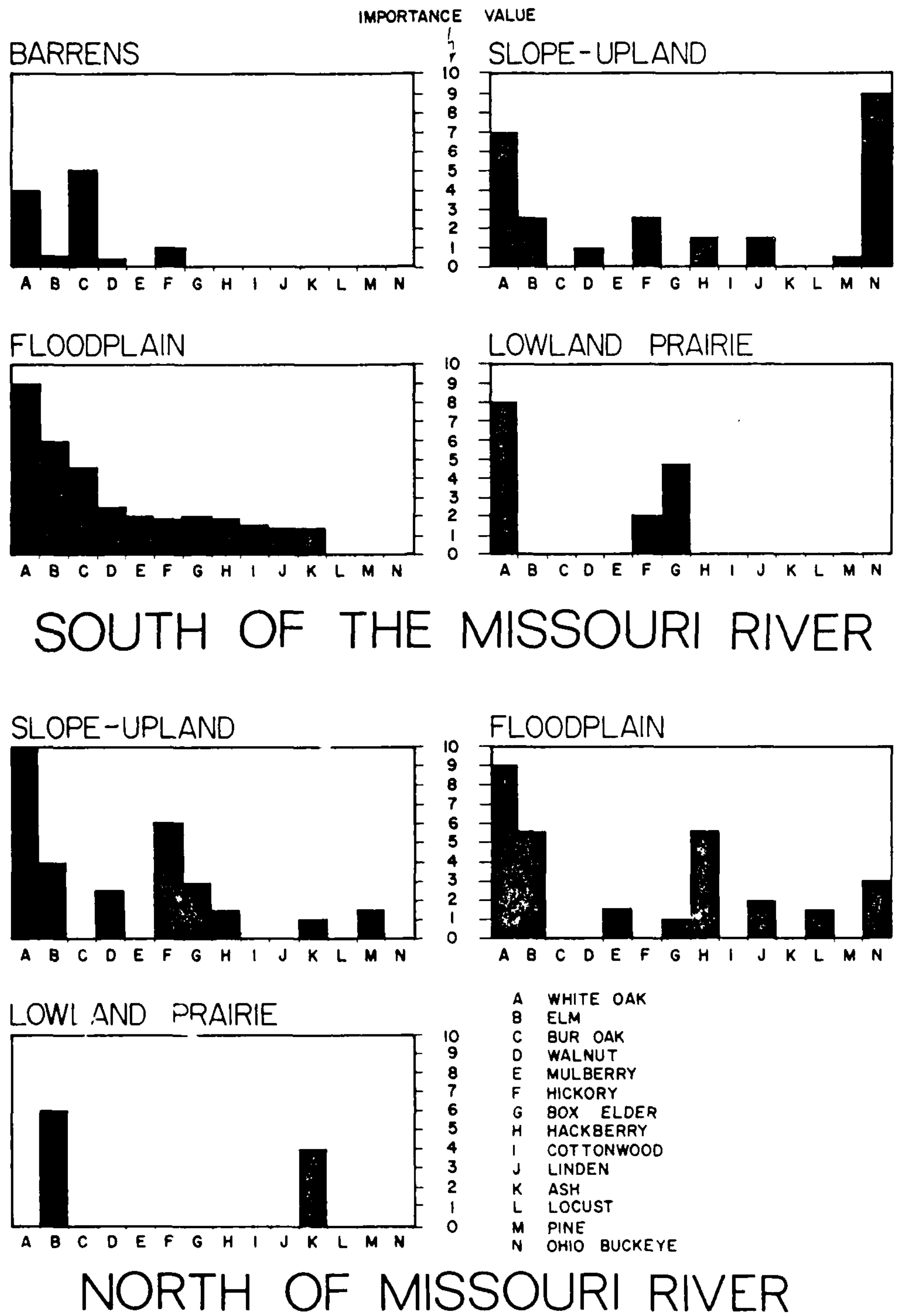


Figure 19. Tree species importance values for the various vegetational zones of the Little Blue Valley.

As indicated by the importance values shown in Figure 19, distinct differences existed in the species composition of the forests north and south of the Missouri River, as well as among the various vegetational zones. The slope-upland forest south of the Missouri was dominated by black and white oaks while other species were relatively unimportant. Floodplain forests north and south of the river contained different accessory tree species of relatively less importance than flood plains north of the river. Lowland prairies on both sides of the river were occupied by relatively few tree species and these were highly dispersed. The slope-upland and flood plain forest north of the Missouri were composed of slightly different species, but with importance values of similar magnitude.

Figure 20 depicts the percentage of trees in each diameter class within the various zones. Certain sizes of trees, particularly the 8 to 16 inch categories comprised the majority of bearing trees. The bearing trees north of the Missouri were slightly larger. The surveyors were selecting trees of good quality upon which they could place township and range markings and were reasonably long lived. Although selective bias did exist, Figure 20 indicates that definite patterns are still observable.

The General Land Office Surveys provide a baseline for the reconstruction of vegetation during the early nineteenth century. Based on the data from these surveys, the slope-upland forest comprised 34 percent, the flood plain forest 18 percent and the lowland prairie seven percent of the total area within the Little Blue region. The remaining area included upland prairie (24 percent), barrens (13 percent), and aquatic areas (4 percent). The following discussion itemizes the plant and animal resources of these zones which were potentially important to prehistoric and historic human economies.

RESOURCE ZONES

Upland Prairie: Upland prairie was the second most extensive vegetational cover in the Little Blue region. The upland prairie consisted of bluestem and other prairie grasses with sumac (*Rhus* spp.), rough leaf dogwood (*Cornus drummondi*), coralberry (*Symphoricarpos orbiculatus*), and hazel (*Corylus*) along the woodland fringe. On lower slopes a belt of switchgrass (*Panicum virgatum*), Canada wildrye (*Elymus canadensis*) or sometimes cordgrad (*Spartina pectinata*) often intervened between bluestem prairie and shrubs (Weaver 1960: 30-40). The General Land Office survey records indicate that isolated groves of trees were common along the prairie fringe. Upland prairie was apparently in a state of constant fluctuation with woodlands as a result of long term precipitation variability, edaphic factors, and prairie fires.

Common upland prairie animals included bison (*Bison bison*), wapiti (*Cervus canadensis*), deer, jackrabbit (*Lepus* sp.), prairie chicken (*Tympanuchus cupido pinnatus*), plover (*Charadrius vociferus*), and snipe (*Gallinago gallinago*). Pronghorn antelope (*Antilocapra americana*) have been found in archaeological contexts as far east as northwest Arkansas (Medlock 1978:17) and west-central Missouri (Parmelee, McMillan, and King 1976) and probably were present in the Little Blue region, particularly during periods of extended drought.

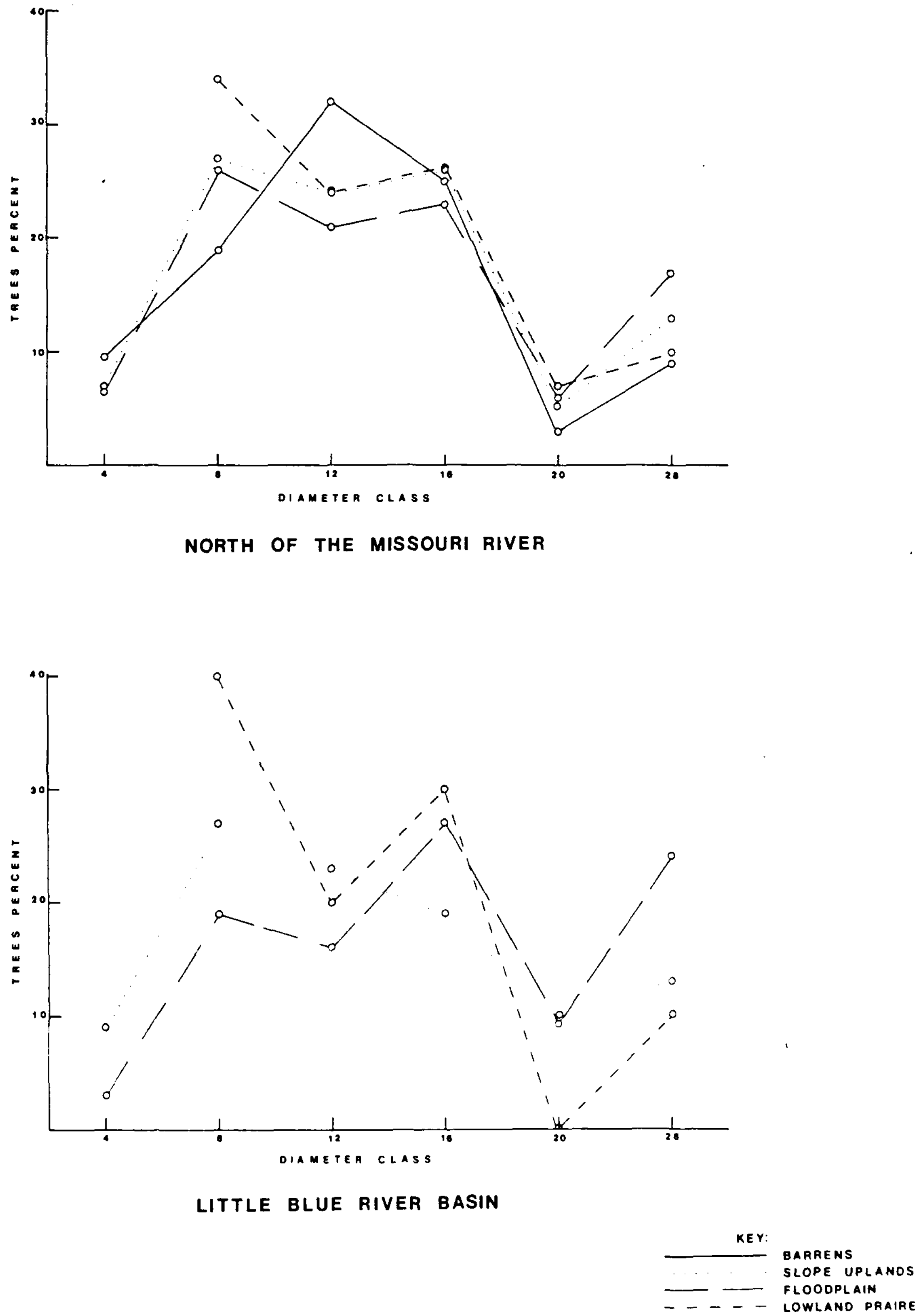


Figure 20. General Land Office surveys bearing tree diameter classes represented in the various vegatational zones of the Little Blue Basin and adjacent areas.

Plants were available for consumption in the form of tubers and shoots in the spring, seeds in the summer and fall, and tubers in the winter (McKinley 1960, Anderson 1964, Hall 1955). The maximum harvest of both plant and animal species is predicted to have been along the edge environment of the prairie fringe.

Barrens: The barrens areas--representing the contact between the prairie and the mesic forest--observed during the GLO surveys were created by a complex set of edaphic and environmental factors. These areas were located primarily on south facing slopes and upland and lowland prairie fringes. The contact between grassland and forest often consisted of a narrow belt of shrubs from a few meters up to several hundred meters in width composed of hazel, sumac, coralberry, and other shrubs (Weaver 1960:63). The General Land Office survey recorded the presence of white oak, black oak, pin oak, and hickory in dense and open stands of timber in this zone along with hazel, and plum and cherry (*Prunus* spp.) scrub brush.

Eight species of bearing trees were recorded in the barrens with a mean distance of 27 m from the corner posts, and a mean diameter of 38 cm. No barrens areas were noted north of the river, indicating that fires were less frequent, or that prevailing winds pushed them northward.

Slope-Upland Forests: The slope-upland forest was the most extensive vegetational zone in the Little Blue basin. This vegetational community consisted of plants that occupied a zone of steep slopes, upland divides, and the edge of the upland escarpment, paralleling the Little Blue River and its tributaries. Dominant plants consisted of hazel, sumac, coralberry, and other shrubs (Weaver 1960:63). The General Land Office survey recorded the presence of white oak, black oak, pin oak, walnut (*Juglans nigra*), and hickory in dense and open stands of timber in this zone along with hazel, and plum and cherry scrub brush.

Primary plant foods were available in this zone during the summer and fall. During the late summer and fall fruits, berries, acorns, hickory and walnut became available. Fewer plant resources were available in the slope-upland community during the winter and spring. Common slope-upland animal species included deer, squirrel (*Sciurus* spp.), cottontail (*Sylvilagus floridanus*), raccoon (*Proycon lotor*), bear, turkey (*Meleagris gallopavo*), passenger pigeon (*Ectopistes migratorius*), grouse (*Tympanuchus cupido*), and bobwhite (*Colinus virginianus*). Grassland species such as bison and wapiti probably made use of edge environments as winter forage. Seasonal movements of deer, turkey and bobwhite included use of this zone, particularly since this zone is located between lowland prairie and hardwoods and the upland prairie (McKinley 1960, Schorger 1966). The passenger pigeon preferring mast producing forest once foraged in flocks of almost incalculable numbers in the slope-upland forest (Schorger 1955).

Riparian Forest: This community consisted of a narrow zone of woodland paralleling the Missouri River and portions of the Little Blue River. The riparian forest was interspersed with areas of disturbed, aquatic and lowland prairie vegetation. Differences in the species diversity of trees used as bearing trees by the GLO surveyors and the relative extent of lowland prairies

were noted in the riparian forests north and south of the Missouri River. Hackberry (Celtis spp.), rare south of the Missouri, was the third most common north of the river. Walnut and hickory were rare north of the river, but were more common south of the Missouri (see Fig. 19). The Little Blue riparian forest was disrupted by extensive wet prairies along its mouth, middle course and portions of tributary streams (Fig. 18).

Twenty-two tree species were present in the riparian forest north of the river, with a mean diameter of 42 cm and a mean dispersion of 9 m. Nineteen tree species were used as bearing trees in the riparian forest south of the Missouri, with a mean diameter of 39 cm and a mean dispersion of 9 m.

The low portions of the flood plains were constantly disturbed by flooding and silting. Willows and elms were the first species of plants encountered on the headwaters of the streams that originate in the upland prairies. Farther downstream cottonwood (Populus deltoides Marsh.) and boxelder (Acer negundo L.) became mixed with willows. On better developed flood plains, red elm (Ulmus fulva Michx.), white elm (Ulmus americana L.), green ash (Fraxinus pennsylvanica var. lanceolata (Borkh) Sarg., and white ash (Fraxinus americana L.), became plentiful. These species with the addition of hackberry, walnut, soft maple (Acer saccharinum), honey locust (Gleditsia triacanthos L.), Kentucky coffeetree (Gymnoclodus dioica) and sycamore (Plantanus occidentalis) were the dominant species of the flood plain forest.

Common shrubs included roughleaf dogwood, indigobush (Amorpha fruticosa), wolfberry (Symphoricarpos occidentalis), coralberry, smooth sumac (Rhus glabra), wild plum (Prunus americana), American elder (Sambucus canadensis), wild gooseberry (Ribes missouriensis), buckthorn (Rhamnus lanceolatus), black raspberry (Rubus occidentalis), prairie rose (Rosa setigera), prickly ash (Zanthoxylum americanum), red osier (Cornus stolonifera), burningbush (Euonymus atropurpurcus) and common blackberry (Rubus allegheniensis). Common woody vines included frost grape (Vitis vulpina), bittersweet (Celastrus scandens), greenbriar (Smilax hispida), poison ivy (Rhus radicans), Virginia creeper (Parthenocissus quinquefolia), and virgin's bower (Clematis virginia) (Weaver 1960:48-49). In addition to these species, the General Land Office survey records indicate the common occurence of white and black oaks, pawpaw (Asminia triloba), linn (Tilia americana), and hickories. Riparian forest plant foods were available in the spring and include rhizomes, shoots and tubers. During the summer, stems, leaves and some fruits became available. Seeds, fruits and nuts could be harvested in the fall. Tubers, roots and rhizomes were available in the winter.

Common animal species in the riparian forest included white-tailed deer (Odocoileus virginianus), turkey, passenger pigeon, squirrel, cottontail, raccoon, oppossum (Didelphis linnaeus) and black bear (Ursus americanus). Bison and wapiti were present, but less common. Several of these species were adapted to edge environments and migrated seasonally between upland and lowland prairies and hardwood environments (McKinley 1960).

Lowland Prairie: Lowland prairies were present both as extensions of upland prairie and as isolated patches within the flooplain forest. The General Land

Office surveys indicate that the lowland prairies were located along the Little Blue River, in the Missouri River flood plain, in the abandoned valley of the Little Blue now occupied by Fire Prairie Creek, and along portions of the Sniabar.

The General Land Office surveys recorded the presence of relatively few species of widely dispersed trees along the fringes of lowland prairies. Three species were present north of the Missouri River, with a mean diameter of 33 cm and a mean dispersion of 14.5 m. South of the Missouri, nine bearing tree species were recorded, with a mean diameter of 38 cm and a mean dispersion of 23 m.

Coarse grasses, such as prairie cordgrass or switchgrass, occupied large areas of soil on higher ground. The largest grassland community prevailing on second bottom lands where the soil is well drained was dominated by big bluestem. These species graded into a border of roughleaf dogwood, coralberry, and poison ivy. Sumac thickets two to four meters high and thickets of wild plum overrun by virginia creeper, frost grape and other vines were present. Tangled black raspberry vines and poison ivy completely covered the ground surface in areas (Weaver 1960:39-41). As can be seen from the above description, the lowland prairie was a rich edge environment which provided a wide range of plant and animal resources. Common animals in the lowland prairie included bear, deer, wapiti, bison, cottontail, turkey, bobwhite, prairie chicken and waterfowl. Animal species common to both bottomland hardwood and upland prairie environments existed very well in the lowland prairie as plant resources characteristic of both were available.

Biomass production was greatest in the lowland prairie during the spring and summer; however limited plant foods were available throughout the year. Deer and turkey were available in large groups in the fall along with migratory waterfowl. Bison and wapiti were noted historically but were uncommon in the lowland prairie (McKinley 1960). The main disadvantage to human exploitation of this zone was summer inundation of the flood plains.

Aquatic: The aquatic community consisted of hydric-adapted plants in and along the Missouri River, the Little Blue and the abandoned channel of the Little Blue. Aquatic environments included active stream channels, oxbow lakes, swamps and marshes. Typical aquatic plant species included bulrushes (Scirpus validus, S. actutus), river bulrush (S. fluviatilis), broad-leaved cattail (Typha latifolia), reed (Pharagmites communis), bur-reed (Sparganium eurycarpum), arrowhead (Sagittaria latifolia) and water plantain (Alisma sp.). Aquatic plants may become isolated or localized with one species often occupying vast areas and forming pure communities. The great bulrushes usually grew in deepest water, cattails at intermediate depths, and reeds in the shallowest. Some marshes were inhabited solely by tall species of sedge (Carex spp.), rush (Juncus spp.) and spike rush (Eleocharis spp.); others consisted of hydric grasses such as rice cutgrass (Leersia oryzoides) and reed canary grass (Phalaris arundinacea). Samller marshes were often entirely populated by forbs such as smartweed (Polygonum spp.) (Weaver 1960:49-52).

Common anima's in the aquatic zone included mussels, fish, frogs, turtles, beaver (Castor canadensis), otter (Lutra canadensis), geese, ducks and other waterfowl. At least four species of aquatic turtles and 14 species of

fish were present in the Little Blue River (Anderson 1942; Pflieger 1971). Beaver were located along and near stream channels. Migratory and resident waterfowl were present along the Missouri River and in open aquatic areas such as swamps and oxbow lakes of the Little Blue and Missouri Rivers.

Aquatic plant resources included shoots and tubers which were available in the spring, stems, leaves, seeds and fruits which were available in the summer and fall, and tubers and rhizomes in the winter. Fish, mussels, turtles, and frogs were most easily obtainable in the spring and summer. Migratory waterfowl were predominately available in the fall and less so in the spring. Hibernating frogs and turtles may have been obtained while collecting tubers and rhizomes in the winter.

Disturbed and successional: Each of the above vegetational communities was susceptible to natural and artificial alteration as a result of periodic silting during flooding, fires or human clearance for camps or villages. The use of fire as a hunting technique has been recorded during the historic period (McKinley 1960; Hudson 1976) and was probably in use during prehistoric times. The General Land Office survey noted several areas where agricultural practices and fires had altered the composition of certain plant communities. Very few fields were present in the 1826 surveys, within or near the Ft. Osage Military Reservation.

As shown in Figure 19, the bearing trees species composition was different in the barrens and slope-upland forests, and the flood plain and flood plain prairie environments. Many of the trees recorded were located in farms and enclosures. In 1843, 15 percent of Twp 48N32W was cultivated with 28 settlers and associated structures, a saw and grist mill, schoolhouse and three major roads. Apparently much of the original forest had been cut to build the structures. Several brushy areas mentioned were probably old fields that were allowed to revert to forest.

Common pioneer plant species in these disturbed areas included sumac and poison ivy, persimmon (Diospyros virginiana), red cedar (Juniperus virginiana), knotweed (Polygonum aviculare), lambs quarters (Chenopodium spp.), green amaranth (Amaranthus hybridus) and ragweed (Ambrosia spp.). Common animal species in disturbed areas included dog (Canis spp.) opossum, raccoon, skunk, deer, turkey, bobwhite, and cottontail.

The majority of the above mentioned plants are edible in the spring as greens, and in the summer and fall provide quantities of wild seeds which can be easily harvested. Animal species were available throughout the year, with fall and winter aggregation of deer, turkey and bobwhite present in disturbed areas.

CHAPTER VII

PHASE II TEST EXCAVATIONS IN THE BLUE SPRINGS AND LONGVIEW LAKE AREAS

Robert R. Peterson
Larry J. Schmits

23JA9 BIKE TRACK SHELTER

Site 23JA9 is located in Blue Springs Corps Tract 152. It is at an elevation of 800-850 ft. (244-259 m) and covers an area of approximately 22,000 sq m. The site consists of two primary localities of prehistoric activity. These are located on the T-1 terrace on the north side of a small tributary of the Little Blue River and in a rockshelter on a steep southeast facing slope of the ridge northwest of the terrace (Fig. 21).

The T-1 terrace is located from 40 to 60 m north of the creek and is approximately 3.5 m above it. The fill of the lower (T-0) terrace appears to be quite recent as there is modern historic material exposed in the creek bank. The T-1 terrace extends along the base of the ridge for about 350 m with cultural material appearing in eroded areas and a road bed for most of this distance. In 1976 crews from the University of Kansas conducted test excavations on this portion of the site (Brown 1977). Twenty one by one m units were excavated on the T-1 terrace and cultural material was noted to a depth of 16 cm below the surface. This depth appears to coincide roughly with a soil change which probably denotes the bottom of the plow zone of the terrace. No diagnostic artifacts or features were noted from this portion of 23JA9.

The rockshelter is located some 12 m above the terrace in an exposure of Bethany Falls limestone which outcrops along the bluff face (Fig. 21). The rockshelter is approximately three m high and overhangs four m at its widest point. The shelter has been used by recent campers and there is at least one modern fire pit built against the rock. Reddened areas along the cliff face indicate the presence of several earlier fires at the present surface level. A number of flakes and tools were present on the surface of the shelter and along the cliff face and a heavy concentration of debitage was noted on an eroded area, just below the shelter.

Description of Investigations

Since the T-1 terrace had already undergone fairly extensive testing in 1976, the 1979 investigations concentrated on sub-surface work at the rock-

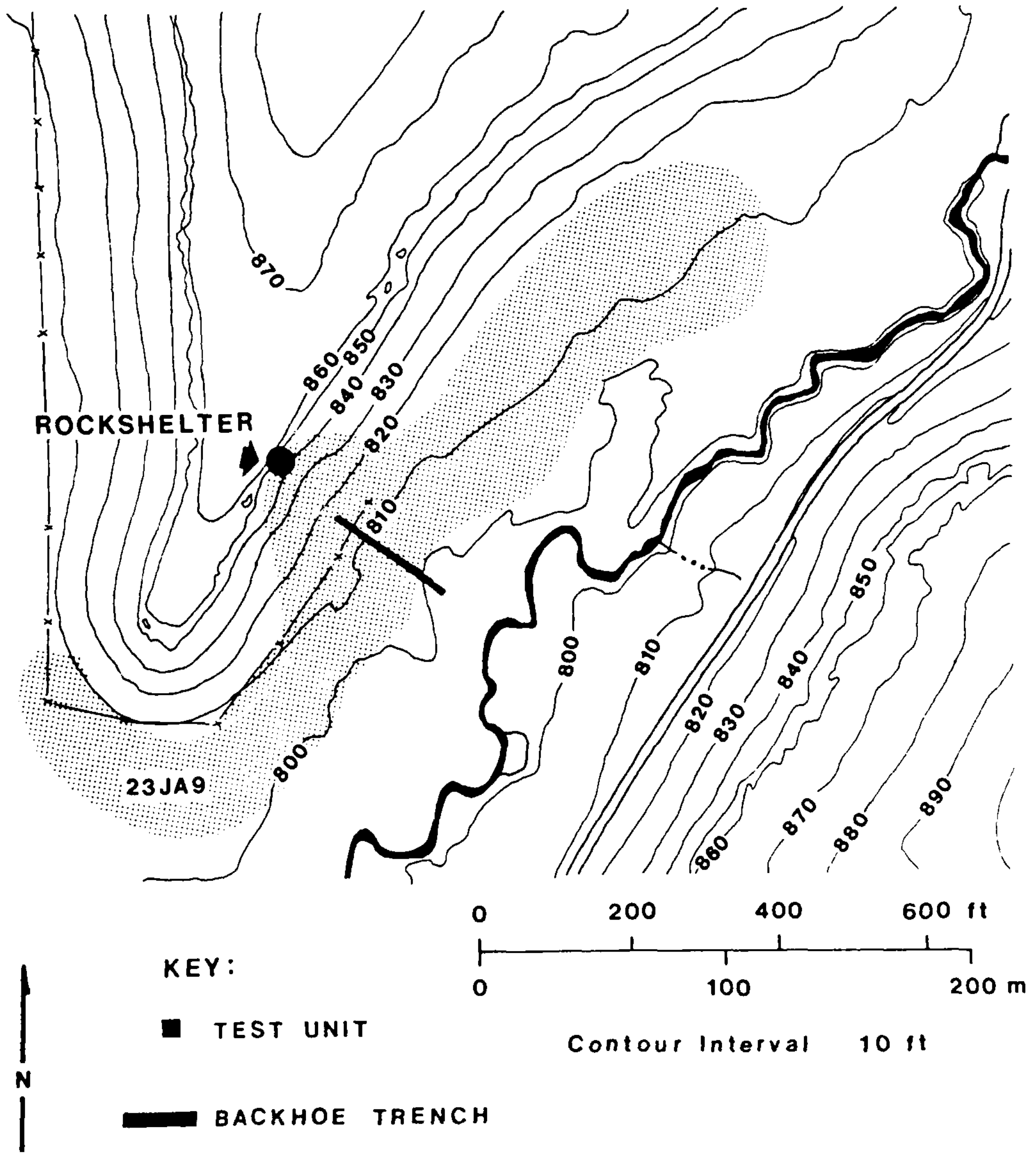


Figure 21. Location of Bike Track shelter and surface scatter on the terrace at 23JA9.

shelter and on the talus slope. Work on the T-1 terrace was limited to plowing, surface collections and backhoe trenching to examine sub-surface stratigraphic relationships (Fig. 22). Material recovered from the terrace included a scatter of lithic debris and a few tools. A small area of higher concentration was present near the edge of the terrace. No diagnostic artifacts were recovered. Tools included biface fragments, cutting and scraping utensils, perforators and gravers. The predominant raw material is Winterset chert. A radiocarbon date on charcoal from a noncultural level 1.6 meters below the surface in a sewerline excavation to the southwest returned a date of 4120±195 years. B.P. (DIC-1682). Based on the evidence in hand, it is not possible to assign cultural affiliations or temporal limits to the component located on the terrace, though it can be assumed to postdate 4120 B.P. Its relationship to the rockshelter can be only conjectural at this time and should be one focus of further inquiry at the site.

Shovel testing on the talus slope revealed subsurface cultural material in the area in front of the rockshelter. The contiguous one by one meter tests comprising Test Unit I, were excavated to bedrock beneath the overhang (Fig. 23). The stratigraphy revealed by Test Unit I (Fig. 23) consists of an upper deposit (Unit II) of dark grayish-brown colluvial clays, silts and gravels containing medium to large fall rock downward into a lighter brown colluvial unit which also contained large amounts of poorly sorted gravels and large fall rock (Unit I). Bedrock was encountered approximately 100 cm below the surface and consisted of a layer of greenish-gray, block clay, representing a decomposed shale. Below this was black laminar shale unit. These both represent the Hushpuckney member of Pleasanton Shale.

Cultural material in Test Unit 1 occurred down to 90 cm below surface with fairly heavy concentration of debris and tools in the 20-30 cm level. Some mixing of historic material such as nails and glass with prehistoric debris was noted down to 40 cm below surface. Tools from the rockshelter included bifacial and unifacial scrapers, knives, gravers, perforators, projectile points and one body sherd. Bone fragments were recovered in all levels and shell fragments were recovered from several. The debitage density was moderately high throughout the profile.

Two more contiguous units (Test Unit 2) were excavated to bedrock on the talus slope approximately three and a half meters below the rock-shelter (Fig. 23). The culture bearing sediments consisted of a dark gray silt loam interspersed with gravel and small to medium-sized limestone rocks (Unit 1) approximately 70 cm thick with an indistinct transition to a lighter tan silt loam with some gravels and rock (Unit II). Below this, at approximately 120 cm below the surface, was a greenish-gray blocky clay and a black laminar shale similar to the bedrock units in the upper test. Cultural material was found down to 90 cm below the surface with the heaviest concentration of material extending to approximately 60 cm however. Tools included one projectile point, an ovoid biface, bifacial and unifacial scraping and cutting tools, cores and number of ceramic sherds. Very little bone was recovered here, possibly due to less favorable conditions for preservation.

No firepits or other features were noted below the surface during the testing. There were a few fragments of pink limestone which may indicate the presence of fires. These were lightly scattered throughout the fill in both

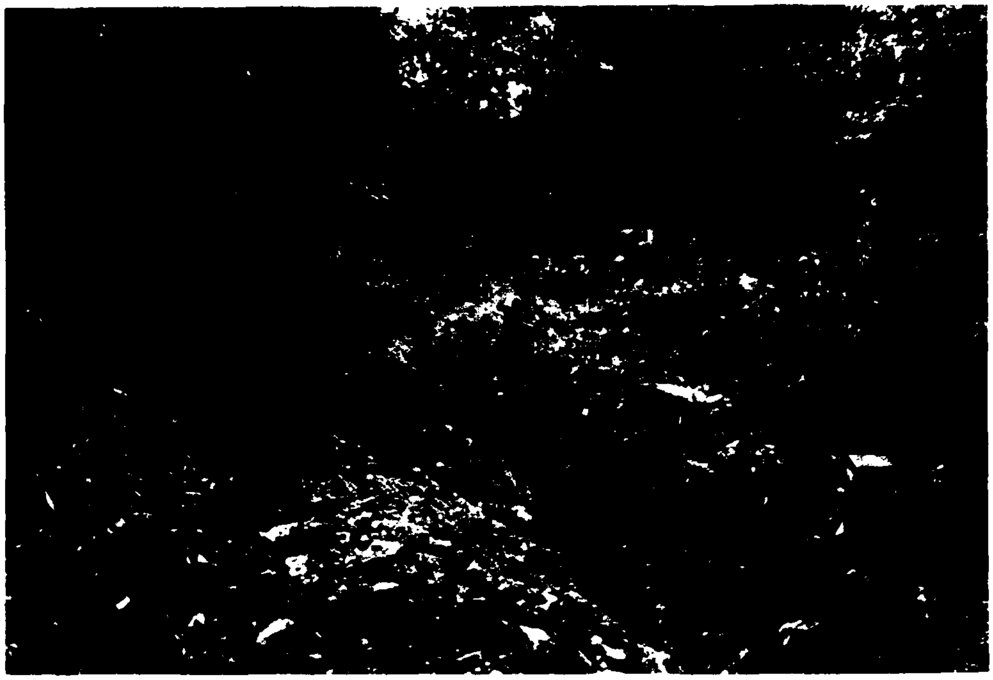
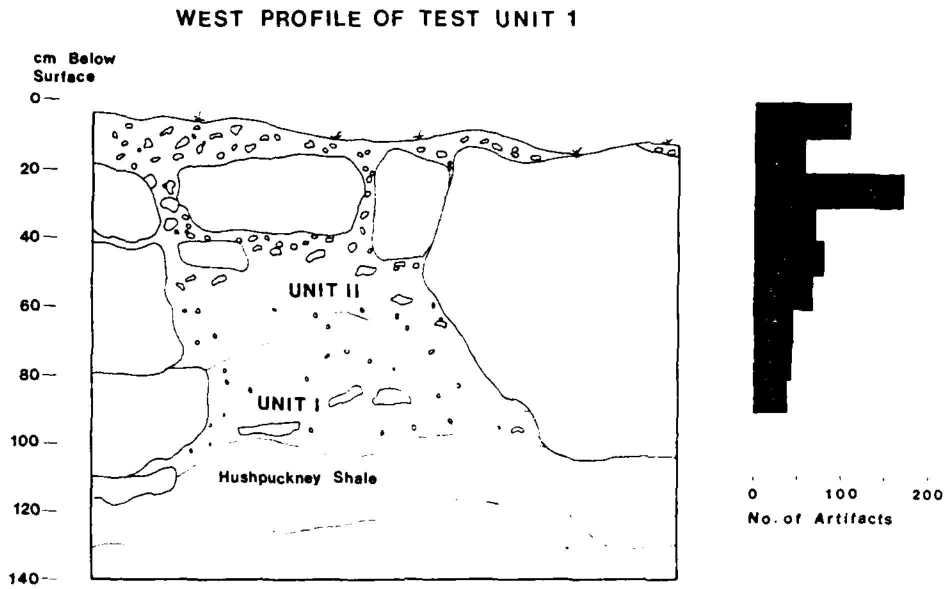


Figure 22. General views of the investigations at 23JA9. View toward shelter (upper) and backhoe trenching operations (lower).



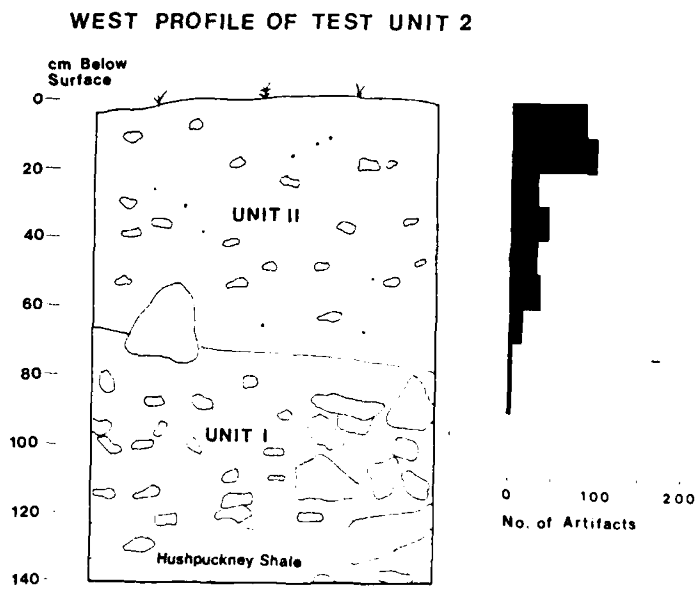


Figure 23. Profiles and artifact distribution in test pits on talus slope.

units. A few such fragments were also noted in the backhoe trench near the bottom of the talus slope and on the terrace.

Artifact Assemblage

The artifacts from 23JA9 include ceramics, chipped stone tools, lithic manufacturing debris, and faunal and floral remains. The distribution of this material is illustrated in Table 8.

Ceramics

Rim sherds (n=1)

One rim (Fig. 24a) was recovered from the upper 10 cm of Test Unit 2 on the talus slope. Its exterior surface treatment is smoothed over cord marking, oriented vertically. The cord marking extends almost to the lip of the sherd. The interior surface is smooth. The lip is rounded and undecorated and the rim is nearly straight. The temper is shell, with fragments of shell still in place and the interior paste is dark gray. The exterior surface color is a light brown. The sherd is 5 mm in thickness. The orifice diameter appears to have been at least 25 mm.

Body sherds (n=15)

A single cordmarked, shell tempered body sherd was also recovered from the upper 10 cm of Test Unit 2. It is identical in surface treatment, temper, and color to the rim sherd from the same provenience. It is 4 mm thick.

Only one ceramic artifact was recovered from Test Unit 1, beneath the shelter (Fig. 24b). It came from the 55-65 cm level below the surface. The sherd has a floated exterior surface in which the wet clay was smoothed with a soft tool or fingers. The sherd is 5mm thick, hard and nonfriable and tempered with a fine grit which appears to be mainly quartzite. The paste is brown near the exterior surface and dark gray in the interior. Its exterior color is a light brown and the interior is gray. There is one roughly trailed groove on the interior surface which appears to be an unintentional mark caused by a smoothing instrument.

Eleven smooth-surfaced body sherds came from the testing at Bike Track Shelter. All were recovered from the 10 to 70 cm levels of Test Unit 2. They fell into two categories based on temper and thickness. These sherds all exhibited light brown surface color and smoothed exterior and interior surfaces. The smoothing appears to have been done with a hard tool of some type, and some sherds have fine striations or smoothing marks on them.

The first category was tempered with crushed granite. Small particles of feldspar and quartz are visible in the matrix. The interior paste is a light tan in color and the temper is moderately coarse. These sherds are relatively thin, ranging from 5-6 mm in thickness. These are six examples of this type in the levels from 20 cm to 70 cm below the surface.

The second category was found intermixed with the first and consists of four smooth surfaced, sherd tempered body sherds and one from the shoulder of a vessel (Fig. 24c). These exhibit a dark gray interior paste with lighter

Table 8 . Artifact assemblage recovered from Bike Track Shelter (23JA9).

	EXCAVATION LEVEL									SHOVEL TESTS	SURFACE		TOTAL
	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90		ROCKSHELTER	TERRACE	
CERAMICS	2	1	4	3	4	1	1						16
CHIPPED STONE TOOLS													
Projectile Points	1				1	1					1		4
Bifaces	1	2	1		1	2						5	12
Unifaces		1			1								2
Edge-Modified Flakes	14	6	7	8	9	2	1	2		3		11	63
Total	16	9	8	8	12	5	1	2		3	1	16	81
MANUFACTURING DEBRIS													
Cores			1			2			1			3	7
Debitage	173	142	168	86	90	90	56	44	31	9		284	1173
Total	173	142	168	86	90	92	56	44	32	9		287	1180
HEARTHSTONE			1	2			1	2	1			12	19
FAUNAL REMAINS	7	3	20	7	4	3	2	2	10	7			65
FLORAL REMAINS						1			1				2
HISTORIC MATERIAL	9	3	5	3								7	27
TOTAL	207	158	207	109	110	103	62	49	43	19	1	322	1390

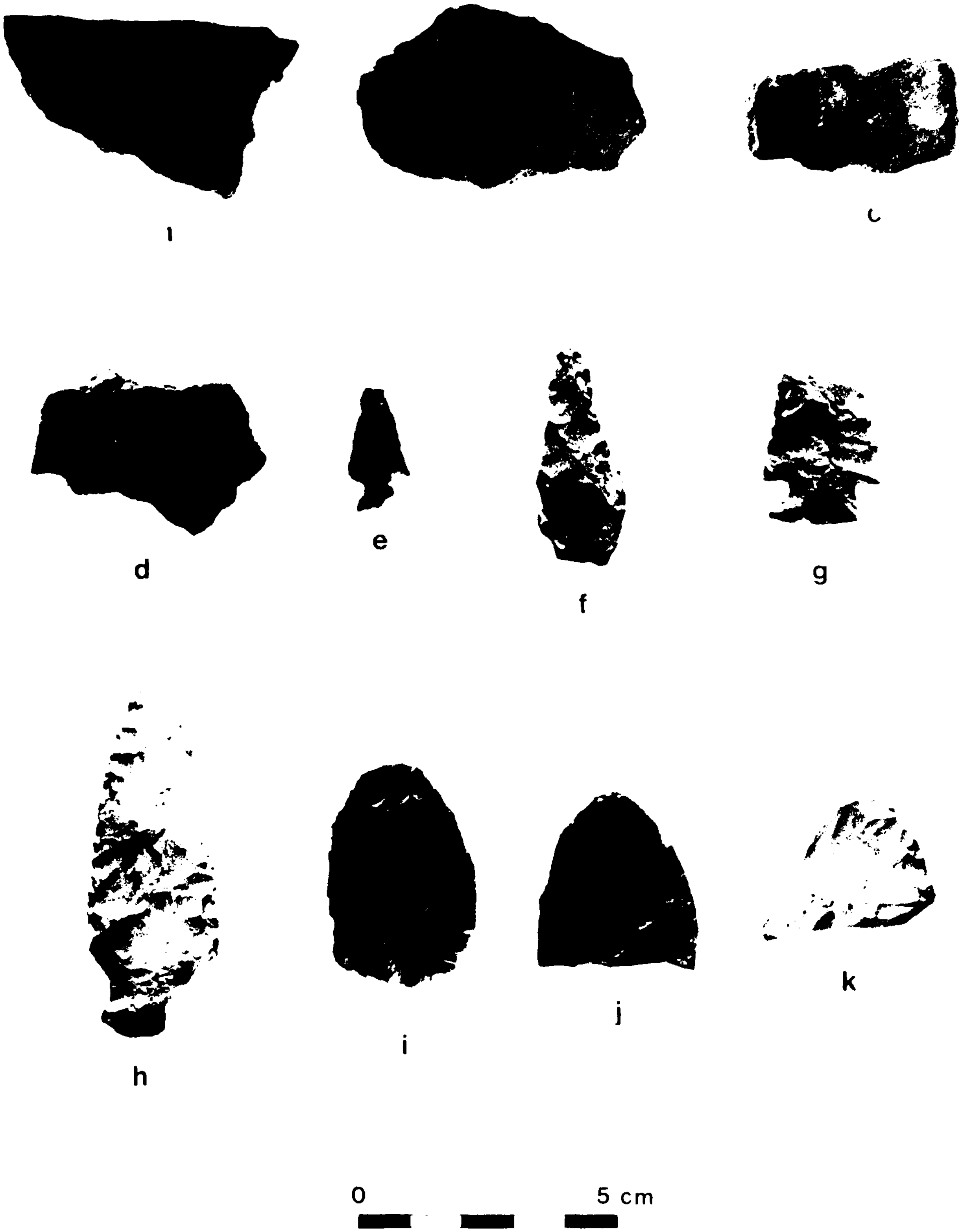


Figure 24. Ceramic and bifacial artifacts recovered from 23JA9: (a-d) ceramics, (e-h) projectile points, (i-k) bifaces.

brown or yellow, angular, sherd fragments. These sherds are thicker than those of category 1, ranging from 7-8 mm. One of these sherds has two lightly trailed lines on its exterior surface (Fig. 24d). These appear to have been made by the end of a hard object such as a stick and are probably related to the smoothing of the surface. They are shallow and irregular and do not appear to be design elements.

Two additional sherds were recovered for which it was not possible to determine the exterior surface treatment. Both are small exfoliated fragments recovered in the 40-50 cm level of Test Unit 2. One of these is tempered with crushed granite and the other with sherd. Both have one smoothed surface, but it is impossible to determine if they represent interior or exterior surface.

The ceramics from Bike Track Shelter appear to represent at least two and possibly three occupations. The single floated surface sherd from the test unit beneath the shelter is very similar to the Middle Woodland, Kansas City Hopewell pottery described by Shippee (1967), Katz (1974:30-35), Martin (1976:22-28) and Brown (1979). Smooth surfaced wares like those from the lower levels of Test Unit 2 have been assigned to the Middle or Late Woodland by various authors (Brown and Ziegler 1979, Martin 1976, Shippee 1967, Katz 1974).

The two sherds recovered from the top of Test Unit 2 are similar to the materials from the May Brook phase occupations in the Little Blue Valley (Schmits 1980). This recently defined phase is represented by several occupations in the area with shell tempered, cord marked pottery and small side-notched arrow points. It has been dated to the Middle Mississippian period and appears related to Plains Village sites in eastern Kansas.

Chipped Stone Tools

<u>Projectile Points</u> (n=4)

Four projectile points, or hafted bifaces, were recovered from the rockshelter and talus slope. One, from the surface just below the shelter, was a small side-notched arrowpoint (Fig. 24e) which is very similar to the points from the May Brook site (Schmits 1980). The point is nearly complete, 25 mm in length, and made of Winterset chert. Just below the surface of Test Unit 1, beneath the shelter, a small roughly worked lanceolate point of a banded gray and pink exotic chert was recovered (Fig. 24f). The point is somewhat asymmetrical and appears to have been heavily reworked. Flaking is invasive with deep irregular flake scars. The point is typologically similar to Middle or Late Woodland points reported by Brown (1977:83). It is associated with a single pottery sherd which appears to be Middle Woodland in age. Test Unit 2 on the talus slope produced a single shallow side-notched dart point from just below the surface (Fig. 24h). The point is 67 mm long and is of Argentine chert. It is of a type referred to by Brown (1979) as Late Woodland.

<u>Bifaces</u> (n=12)

Bifacial tools of various types were recovered from Bike Track Shelter (Fig. 24i-k, Figure 25a-h). Seven were recovered from the rock-shelter and five others came from the terrace surface. Four of those from the test units and one from the terrace had wear indicating use as a scraping tools. This

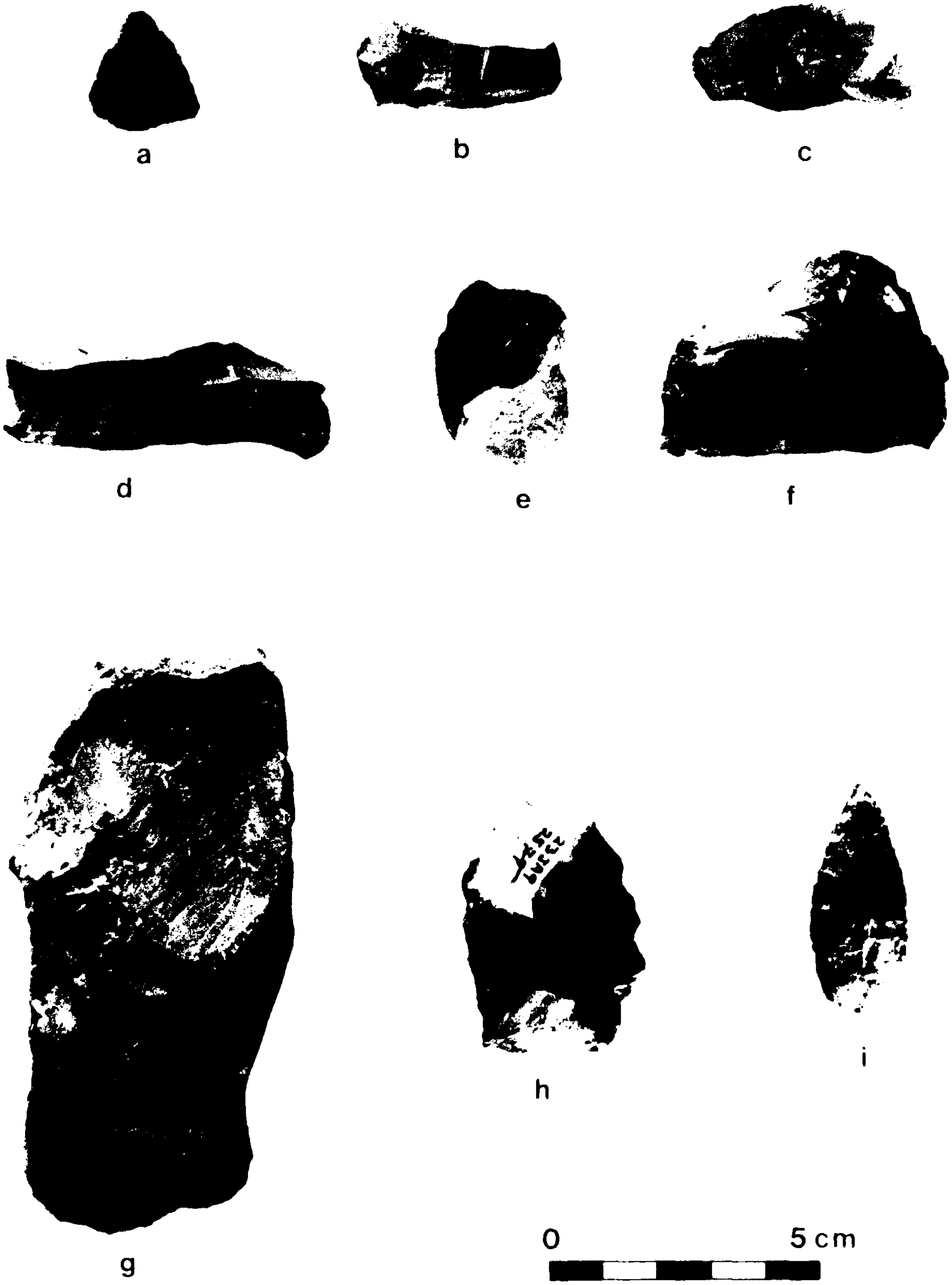


Figure 25. Bifacial and unifacial artifacts recovered from 23JA9: (a-h) bifaces, (i) uniface.

wear generally consisted of small areas of unidirectional step fracture attrition on the edge of the tool. Three thin biface fragments exhibited wear indicating cutting use and are classed as knives. The remainder are roughly worked blanks. Winterset chert made up most of the material used with one Argentine and two exotic specimens.

Unifaces (n=2)

There were two unifacially worked tools, both of which may be projectile points. One is a very small trapezoidal flake worked on three edges which may represent a fragment of the base of a projectile point. The other is a thin, curved flake carefully retouched on its dorsal surface to form a small lanceolate (Fig. 25i). It is 44 mm long, 19 mm wide and only 5 mm thick. The flaking is invasive, forming serrated blade edges and the base is rounded. It exhibits bidirectional marginal retouch near the tip. Slight rounding and smoothing of the serration tips indicates that it may have been used as a cutting tool. It could, however, also be a preform for a small projectile point. It came from the 10-20 cm level beneath the rockshelter.

Edge-Modified Flakes (n=63)

The largest percentage of lithic artifacts from nearly all levels in both units as well as from the surface collection on the terrace were edge-modified flakes. These included a number of small cutting and scraping tools, notches, perforators and gravers, some of which exhibited combinations of working edge types.

Manufacturing Debris (n=1180)

Four Winterset cores were recovered from the test units. None was larger than 54 cm in maximum length and all were free of cortex. Three cores were recovered from the terrace, only one of which had any cortex on it. The small number of cores and the fact that 93% of the flakes recovered from the site were tertiary reduction flakes (i.e., had no cortex on them) indicated that very little primary or secondary lithic reduction occurred at this site. The tool manufacture that was being performed was from prepared blanks or preforms. The overwhelming majority of the lithics at the site were Winterset chert. There was only one flake out of 1173 recovered identified as non-Winterset, but six of the 82 tools were of other material. Of these one was identified as Westerville chert and five as exotic materials. These percentages indicate either that exotic lithics were curated to a greater extent than local materials, or that exotics were brought in the form of finished tools.

Faunal Remains

Unworked Bones (n=65)

Faunal remains in the form of burnt and unburnt bone fragments were recovered from all levels of the upper test unit beneath the shelter and the talus slope. Faunal remains included those of several small animals and birds as well as deer. The majority showed evidence of green bone breakage. Several fragments of freshwater mussel shell were also recovered in the upper test unit.

Floral Remains

Charred Nuts (n=2)

Fragments of charred nuts were recovered from the 55-65 and 85-95 cm levels below the surface in Test Unit 1 below the overhang. These have been identified as bitternut hickory (*Carya cordiformis*) and black walnut (*Juglans nigra*). Both are available in the fall and would be found in the vicinity of the site. The presence of these materials indicates use of local mast resources and thus suggests fall occupation of the shelter. Inferences about seasonal utilizaion based on findings of charred nuts must, however, be made with caution due to the possibilities of storage of such resources.

Historic Material

Historic Debris (n=27)

The historic material was all from the upper 40 cm of Test Unit 1. It consisted of a glass jar, the lid from a second jar, crockery and glass fragments, and a small caliber shell casings. The material may have filtered down around the fall rock or have been carried downward by rodent action. There is a fair amount of modern debris scattered over the slope below the shelter. Seven modern items were also recovered from the surface collection on the terrace.

Discussion

The T-1 terrace at 23JA9 shows evidence of occupation in the form of a surface scatter of cultural material. There are no diagnostic artifacts for the assignment of a cultural affiliation, but the lack of any pottery could be viewed as evidence for an Archaic affiliation. Such assignment can only be speculative at this time, however.

The artifact assemblage from the rockshelter at 23JA9 exhibits typological evidence of occupations during the Middle-Late Woodland and Mississippian periods. The tool inventory indicates that hunting, food preparation and tool manufacturing activities took place at the site. The very low proportion of primary and secondary flaking debris to small (less than 2 cm) flakes indicates that little initial stage tool production took place in the shelter. The inhabitants were working with blanks and preforms of Winterset chert which had been prepared at some other location. The size of the available living space and the depth of the deposits indicate an extended series of occupations by small groups. Further work at the site is necessary, however, before the actual pattern of settlement can be determined.

The Mississippian occupation at the rockshelter exhibits ceramic similarities to the proposed May Brook phase (Brown 1979, Schmits 1980) and could provide valuable information regarding settlement and subsistence patterns of this phase. Evidence of both food preparation and final stage tool manufacture are present. Preservation of faunal and floral remains in the site indicate that great potential exists for answering questions on subsistence and settlement strategies in the Middle-Late Woodland and Mississippian periods in the Little Blue Valley.

Recommendations

Bike Track shelter is one of a small number of known rockshelter sites in the area. It exhibits intact cultural deposits of Middle-Late Woodland and Mississippian periods. The latter occupation is tentatively included in the recently defined May Brook phase and is an example of a previously unknown settlement strategy for this phase. The May Brook occupation is thus significant as a resource for understanding the larger strategy of May Brook phase peoples. The site contains well preserved cultural stratigraphy with both faunal and floral remains as well as a wide range on non-perishable materials. These materials could provide significant information in a program of systematic excavation and study which would have a bearing on the cultural chronology, subsistence and settlement patterns, and seasonality within the Little Blue Valley.

In addition, 23JA9 can be considered to have social or public significance as defined by Schiffer and Gummerman (1977:245). The site is interesting archaeologically and is in an attractive setting. These factors make it an ideal location in which to develop an interpretive display which could provide an educational and recreational facility to help visitors and local residents become more aware of the historic heritage of the area and their part in preserving it. Such a facility could be designed as a minimum maintenance facility using permanent explanatory markers and possibly utilizing part of the site itself for display purposes.

The site is above the flood pool for the proposed Blue Springs Lake and biking trails are proposed for the T-1 terrace and the top of the ridge above the rockshelter. The shelter itself will be visible from the terrace and so would be particularly vulnerable to vandalism. It is already well known and has been used by campers for a number of years, as evidenced by the modern firepit.

Excavation of the rockshelter would eliminate the danger to the archaeological resources and at the same time provide material and data for an interpretive exhibit. The site should be excavated with such a display in mind as it might be possible to leave representative soil profiles or features for display purposes. The work should be concentrated on the rockshelter, but further plowing and surface collection of the terrace might produce enough diagnostic material to clarify the relationship of the two areas of the site. If mitigation through excavation and study is not possible, we recommend securing the rockshelter locality with a fence to prevent vandalism and destruction of the site.

23JA37 BLACK SNAKE SHELTER

Site 23JA37 is a rockshelter located in Blue Springs Corps Track 110. The shelter faces east and covers an area of approximately 30 sq m at the top of a steep slope. The Little Blue River is about 400 m east of the site and 18 m below it. 23JA38, a May Brook phase and Early Woodland period occupation site, is on the floodplain just below the rockshelter. 23JA164, a late

Archaic and Woodland occupation, is at the end of the ridge to the north; and the Turner Casey site (23JA35), a large Nebo Hill occupation, is on the ridge above (Fig. 26).

At present the shelter overhang is approximately 2.5-3 m long and about 3 m high (Fig. 27). It overhangs about 2 m, but the amount of large rock fall on the slope below indicates that it may have been larger at one time. The soil towards the back of the shelter has remained dry.

Figure 27. General view of Black Snake Shelter from the south.

The site was originally recorded by Heffner (1974:12) and has been known to local collectors for many years. Brown (1977:45) assigned it a Late Archaic cultural affiliation based on projectile points recovered by Mike Casey, a local artifact collector. Brown's investigations did not recover any new cultural material at the site. In subsequent discussions, Mike Casey has indicated that the Nebo Hill projectile points he collected from the site came from the area above the shelter and may in fact be associated with site 23JA35, a Late Archaic Nebo Hill site which covered most of the top of the ridge and has produced a large number of such points.

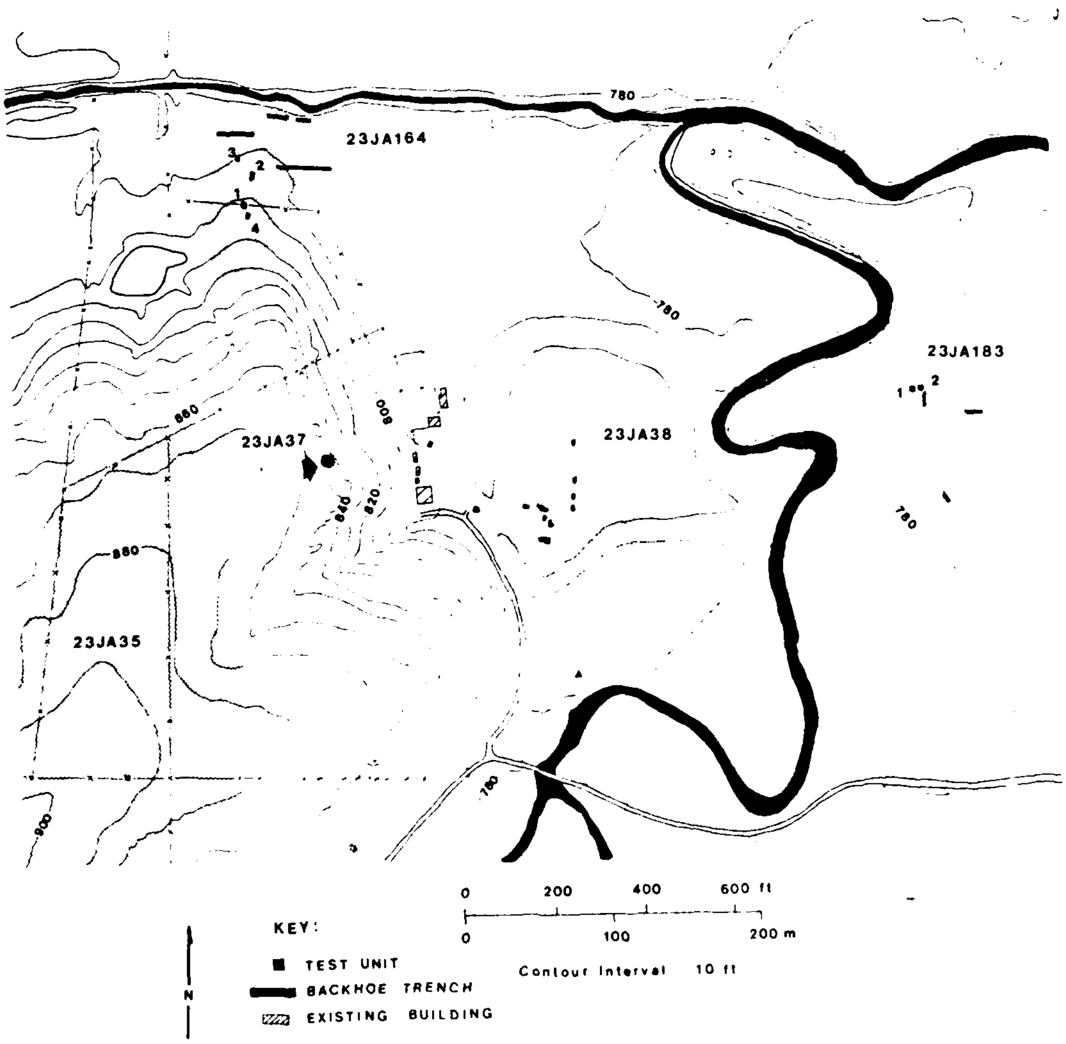


Figure 26. Location of 23JA37, 23JA164, 23JA183 and neighboring sites.

Description of Investigations

The 1979 field work at Black Snake Shelter consisted of the excavation of three one by two m units beneath the rockshelter and on the slope immediately below it in order to determine the extent and condition of buried cultural deposits associated with the shelter (Fig. 28).

In the unit directly under the overhang (Test Unit 1) cultural material was recovered to a depth of 40 cm below the surface. This roughly correlated with an upper, dark gray, organic rich, clay loam (Unit II). This deposit is underlain by a brown silty clay interspersed with limestone fall rock and pebbles (Unit I). Little cultural material was noted in Unit I under the shelter itself. The two test units in front of the shelter (Test Unit 2, Test Unit 3) exhibited a black silty clay loam, heavy in organics (Unit II), over the same brown silty clay (Fig. 29). The upper loam became thicker down slope away from the shelter. Cultural material in both these test units extended into the lower, silty clay, but the greatest percentage of material was in the upper unit.

About 300 artifacts were recovered from the test units with the largest percentage from the two units outside the present dripline. Lithic debris was recovered to a depth of 130 cm BS in Test Unit 3 on the slope, but the highest densities of material were in the upper 50 cm. Although no features were intercepted by our test units, the deposits were apparently undisturbed, and features may be preserved elsewhere.

Artifact Assemblage

Cultural material included a ceramic sherd, projectile points, bifaces, faunal remains and carbonized nuts in addition to lithic debris (Table 9). The deposit appears to be relatively undisturbed and to contain a good stratigraphic record of the occupations of the shelter.

Ceramics

Body Sherds (n=1)

A single ceramic body sherd was recovered from the 20-30 cm level of Test Unit 1 on the slope (Fig. 30a). It is thick (11 mm) and friable with a temper of coarse angular sand or crushed quartz with iron pyrite flecks visible. The surface is cordroughened, and the color is a light buff. It is similar to Late Woodland pottery described from the Fishing River drainage by Martin (1976:41).

Chipped Stone Tools

Projectile Points (n=2)

Two projectile points were recovered from the site. One of these is a large, wide lanceolate of gray Winterset with shallow side notches and a slightly expanding base (Fig. 30b). The basal margin is moderately concave, and several thinning flakes have been removed from one surface. The point is similar in general form to Late Woodland points reported by Martin (1976:40-41) and Brown (1979) and to Late Woodland materials reported from central

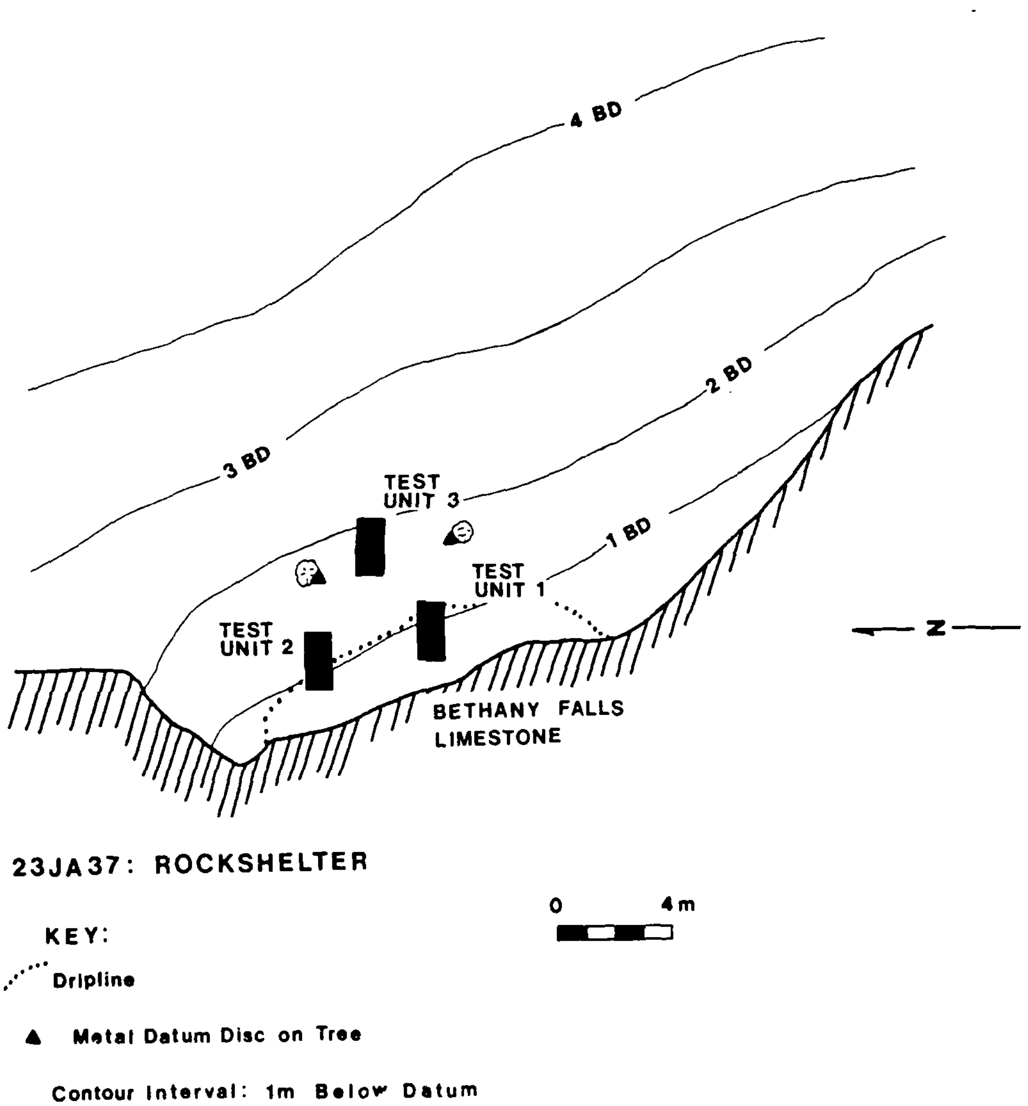


Figure 28. Plan view of Black Snake Shelter (23JA37) showing the locations of the test units.

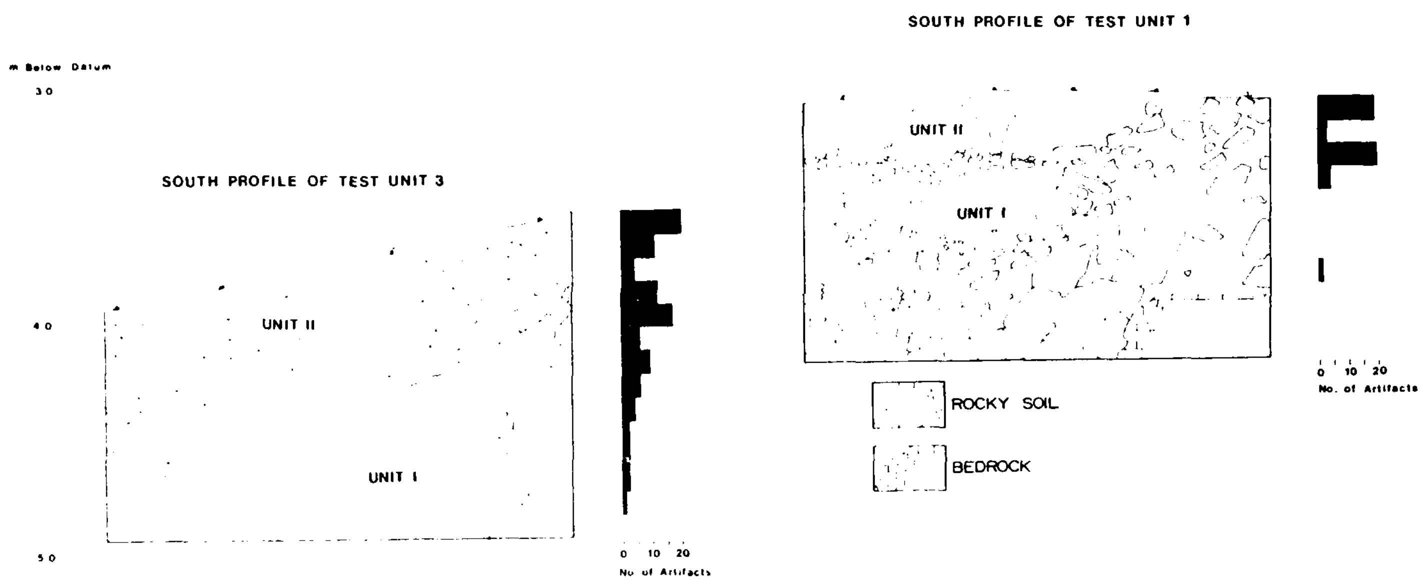


Figure 29. 23JA37: Profiles of Test Units 1 and 3 showing distribution of artifacts.

Table 9. Artifact assemblage from 23JA37, Black Snake Shelter

	EXCAVATION LEVEL													SURFACE	TOTAL
	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130		
CERAMICS		1													1
CHIPPED STONE TOOLS															
Projectile Points			1	1											2
Bifaces			1	1		1									3
Edge Modified Flakes	2	9	8	2	2	3	1	1					1	2	28
Total	2	9	10	2	2	3	1	1					1	2	33
MANUFACTURING DEBRIS															
Cores	3		1	4	1										9
Debitage	37	52	72	20	34	11	10	5	4	2	2	2		3	248
Total	40	52	72	20	34	11	10	5	4	2	2	2		3	257
HAMMERSTONES	1														1
GROUNDSTONE		1													1
MINERAL		2		1			1								4

continued

Table 9. Artifact assemblage from 23JA37, Black Snake Shelter.

	EXCAVATION LEVEL													SURFACE	TOTAL
	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130		
HEARTHSTONES	22	38	58	41	29	20	2	2			1				213
FAUNAL REMAINS															
Worked Bone					1										1
Unworked bone	3		1	1	2	3	1								11
Total	3		1	1	3	3	1								12
FLORAL REMAINS			2			3									5
HISTORIC MATERIAL	1														1
TOTAL	69	99	147	64	69	40	14	9	4	2	3	2	1	5	528

Figure 30. Artifacts from Black Snake Shelter (23JA37): (a) body sherd, (b-c) projectile points, (d-f) biface fragments, (g) chert hammerstone, (h) mano fragment, (i) worked bone.

Missouri (McMillan 1965, Chapman 1954). This projectile point was recovered from the 20-30 cm level of Test Unit 1.

The second point, from the 30-40 cm level of Test Unit 2 is a roughly flaked lanceolate of Argentine chert (Fig. 30c). It has straight blade edges tapering slightly toward the base. The base is concave, and several flakes have been removed from one surface to thin it. The distal end shows evidence of impact fracturing. The point is difficult to classify typologically but appears to be a Late Archaic Nebo Hill point related to those of 23JA35 on top of the bluff.

Bifaces (n=3)

Three fragmentary bifaces were recovered from the testing (Fig. 30d-f). They were all fragments of lanceolate or ovate bifaces, one appears to have been used as a chopping tool. They are all of Winterset chert. Two were recovered from Test Unit 2 and the other from Test Unit 3 in front of the shelter.

Edge-modified Flakes (n=28)

There were 28 flakes with marginal retouch or utilization on them. These included cutting and scraping tools, notches, utilized projections and combination tools.

Manufacturing Debris (n=257)

This category was represented by nine Winterset cores and 248 flakes, 87 percent of which were tertiary reduction flakes. Almost all of the debitage was made up of Winterset chert.

Classes of Debris

Hammerstone (n=1)

One chert hammerstone was recovered from just below the surface in Test Unit 1 (Fig. 30g). It is somewhat rounded cobble of Winterset chert 92 mm long, 65 mm wide and 45 mm thick. It weighs 285.5 g.

Groundstone Tools (n=1)

One sandstone mano fragment was recovered (Fig. 30b) from the 10-20 cm level of Test Unit 2. It is 83 mm long, 50 mm wide and 35 mm in thickness, and is too weathered to show striations or scratches on its surface.

Minerals (n=4)

Four fragments of hematite were recovered from the testing. One of these exhibits a series of parallel striations on one surface which may indicate utilization. It came from the 70 cm level of Test Unit 2.

Hearthstones (n=213)

A total of 213 weathered, reddened limestone cobbles were recovered from the testing. The majority of this material came from the two test units outside of the shelter. The cobbles were relatively evenly distributed throughout the deposits. The stones from Test Unit 3, farthest down slope, were much darker in color than those of the other units. There were several from this unit which exhibited a dark reddish brown color while the majority of the other material was only slightly pink.

It is not certain if these cobbles were fire-reddened and thus actual hearthstones, or if the reddening is a product of natural soil weathering and stain. The distribution of the cobbles does not seem to correlate highly with the rest of the cultural material, and at this time the question must remain open.

Faunal Remains

Worked Bone (n=1)
One fragment of deer (Odocoileus sp.) longbone has two slightly polished, faceted surfaces at the ends (Fig. 30i), with parallel striations. The appearance suggests smoothing and polish by unidirectional friction on a fairly soft material, possibly hide. The tool is 39 cm long and came from the 40-50 cm level in Test Unit 2.

Unworked Bone (n=11)
Eleven unidentifiable bone fragments were recovered from the test units. Based on the size of the fragments, the majority appear to be from large mammals such as deer.

Floral Remains

Charred Nuts (n=5)
Five charred nut fragments were recovered from Test Unit 2 in front of the shelter. One nut fragment was identified as oak (Quercus sp.), and a second as bitternut hickory (Carya cordiformis). Others could not be identified. These are available during the fall of the year and would indicate a fall occupation of the site. As noted earlier, however, the possibility of storage of these resources must be taken into account when making interpretations of seasonality for such evidence. No evidence of such storage was noted at the site.

Historic Material

Historic Debris (n=1)
The only historic material recovered was a small glass tube from the upper 10 cm of Test Unit 1. It is 34 mm long and 5 mm in diameter with a flared end.

Discussion

23JA37 is a small rockshelter occupied during the Late Archaic and Late Woodland periods. The Late Archaic occupation may be related to the large Nebo Hill site complex on the bluff top above (23JA35) and may represent a small ancillary processing or gathering locality. The Late Woodland component at Black Snake Shelter may represent short term subsistence related activities. The presence of charred nut hulls and a mano fragment indicate that the processing of vegetable foods took place at the site. The sample recovered is, however, too small at this time to infer prehistoric activities or seasonality. The test investigations have revealed the presence of undisturbed cultural materials which could provide valuable information about the subsistence and settlement patterns in the area.

Recommendations

Site 23JA37 is a rockshelter site and so is one of few examples of this settlement strategy in the Little Blue River area. It contains both Late Archaic and Woodland components and is the only rockshelter in the area with a Nebo Hill component. Both faunal and floral material were recovered from the testing, and the site appears to contain relatively undisturbed deposits. It is therefore significant in that it can be expected to provide valuable data regarding the settlement and subsistence patterns for the Late Archaic and Late Woodland periods.

The site is located nine m above the flood pool of the proposed Blue Springs Lake. Although relatively safe from damage due to inundation, it will likely suffer from secondary impact as it becomes accessible. It is located near a proposed marina and recreation area and would probably suffer damage or destruction as a result of visitor activities. The site is therefore recommended for Phase III data recovery. Such excavations should focus on the recovery of faunal and floral remains and datable materials in order to further define the cultural sequence at the site and provide data on the subsistence strategies and seasonality.

Our recommendation for Phase III data recovery at 23JA37 assumes that preservation is not possible because of likely long-term impact of visitor vandalism. An option that might be possible is fencing of the site area and regular monitoring by security personnel.

23JA109

Site 23JA109 is located in Longview Corps Tract 125. It is at an elevation of 820 ft (250 m) on the T-1 terrace on the east bank of the Little Blue River at the base of a steep bluff (Fig. 31). Brown (1977:77) reports recovering plain surfaced, sand tempered pottery on the site in 1976, along with lithic debris and tools. Based on the pottery, he assigned a Middle Woodland, Kansas City Hopewell, cultural affiliation to the site.

Brown (1977:127-128) recommended data recovery excavation at the site; this was our original contractual obligation. Prior to the commencement of the field work, however, the site was extensively impacted by the construction of a new gas pipeline and by excavations resulting from the salvage of an earlier pipeline which cut through the site area. The damage included the grading of an area of some 100 by 50 m on the terrace (Fig. 32) and a 20 by 140 m area on the slope to the east. In addition, trenches had been cut through the site to recover and salvage an older pipeline, and a deep bulldozer cut was made from the terrace down to the river. Only a few flakes were noted on the surface of the disturbed areas. Damage to the site was quite extensive, and data recovery was no longer considered productive. A contract modification was implemented to carry out testing to determine if any significant cultural deposits remained around the perimeter of the disturbance.

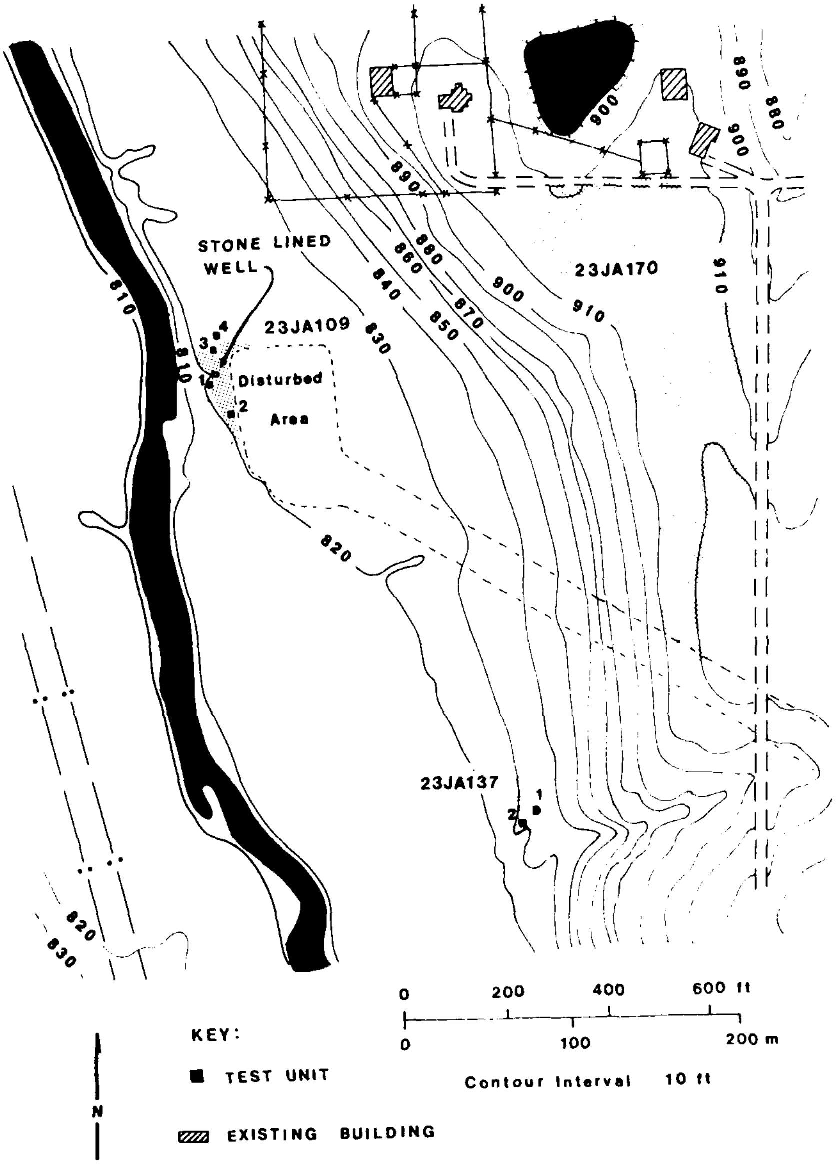


Figure 31. Location of 23JA109 and 23JA137.

Figure 32. General view (to the south) of construction activities which destroyed 23JA109.

Description of Investigations

There is a large quantity of historic material in the area near the terrace edge. The remains of a concrete river ford can be seen just upstream from the site, and a stone-lined well with a concrete wellhead was present in the undisturbed area.

Three one by two m test units and one one by one m unit were dug on the terrace just outside the disturbed area. The stratigraphy (Fig. 33) of all units was similar and consisted of an upper, dark brown organic silt loam (Unit III) approximately 30 cm deep over a light grayish brown clay silt layer 10-30 cm thick (Unit II). This rests on top of a dark silty clay (Unit I). The two lower units both contain small flecks of oxidation.

Test Units 1 and 2 were taken to 90 to 80 cm respectively. In each test unit a light deposit of prehistoric cultural material was recovered to a depth of 60 cm, well into the gray brown clay silt unit. Test Unit 1 contained historic material to a depth of 40 cm, and Test Unit 2 to 30 cm. Test Unit 3, north of the well, produced a large quantity of historic material and a few prehistoric items to a depth of 30 cm. Test Unit 4, farther north, was taken to 60 cm below the surface but produced no cultural material. No features, ceramics, or diagnostic artifacts were recovered during the testing.

Artifact Assemblage

The artifacts from the site included bifaces, flake tools, and a few fragments of groundstone tools, as well as a large quantity of modern historic material. Artifact categories and their locations are tabulated in Table 10.

Edge-Modified Flakes (n=4)
One of these tools had a notch on one edge as well as a small, straight working edge. The others had straight or slightly incurvate working edge. All of the worked edges in the sample exhibited attrition and step fracturing, indicating probable scraping use. All of these tools were of Argentine chert.

Manufacturing Debris (n=30)
The debitage densities at the site were low and consisted of flakes and chunks of Winterset and Argentine chert. Tan Winterset and Argentine made up 45 percent of the flakes and 83 percent of the chunks at the site. The remainder was blue Winterset.

Table 10. Artifact assemblage from 23JA109.

	TEST UNIT			SURFACE	TOTAL
	1	2	3		
CHIPPED STONE TOOLS					
Bifaces				2	2
Edge-Modified Flakes	2	1	1		4
Total	2	1	1	2	6
MANUFACTURING DEBRIS					
Debitage	11	10	6	3	30
Total	11	10	6	3	30
GROUNDSTONE	6				6
FAUNAL REMAINS	1				1
HISTORIC MATERIALS	31	1	134		166
TOTAL	51	12	141	5	209

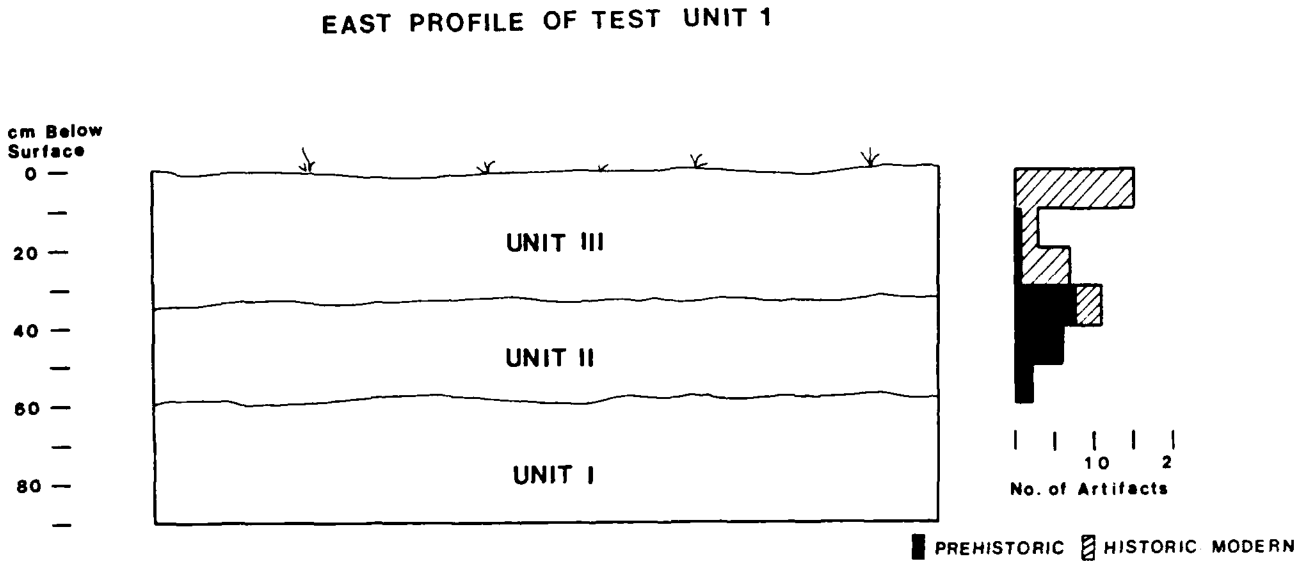


Figure 33. Profile and distribution of cultural material at 23JA109.

Groundstone (n=6)

Six small fragments of sandstone were recovered from the 30-50 cm levels of Test Unit 1. These do not exhibit any worked surface, but, because no natural sandstone appears to exist in the area, they are likely eroded fragments of a groundstone tool.

Bifaces (n=2)

Two bifacial tools were recovered from the surface of the bulldozer cut on the terrace edge. One is a thin, lanceolate bifacial knife of a gray Winterset chert (Fig. 34b). The other appears to be an uncompleted projectile point (Fig. 34c). It is a lanceolate biface with a single unsuccessfully completed notch on one side. It may have been rejected as a projectile point due to severe hinge fracturing at the notch point. It has attrition on its edge and may have seen service as a knife.

Historic Debris (n=166)

Historic material recovered from the test units and from the bulldozer cut included glass bottles, crockery, flatware, glass fragments, nails, one musterole jar with a metal lid, wire, cans and other metal items (Fig. 34a and Figure 35 a-d). The bottles have neck forms which date from the early part of the twentieth century.

Discussion

The site appears to have been a Middle Woodland occupation site, but the grading and trenching of the major portion of the site area have made impossible further reliable interpretations. The presence of the well and the amount and type of historic debris indicate that a house stood somewhere nearby, although no evidence of such a structure could be found. Many of the larger historic items came from a trash dump located at the base of the creek bank west of the well. The material is typical of that which would be expected around a farmhouse.

The mixing of the historic and prehistoric materials of the deposits remaining indicates that there has been a great deal of disturbance prior to the grading and trenching and little reliable information is still available. The site's potential for further work is considered to be negligible.

Recommendations

Construction activities have largely destroyed 23JA109. Testing around the perimeter of the disturbed area revealed only a mixed historic and prehistoric deposit. Due to its severely impacted condition, the site is not considered significant, and no further work is recommended.

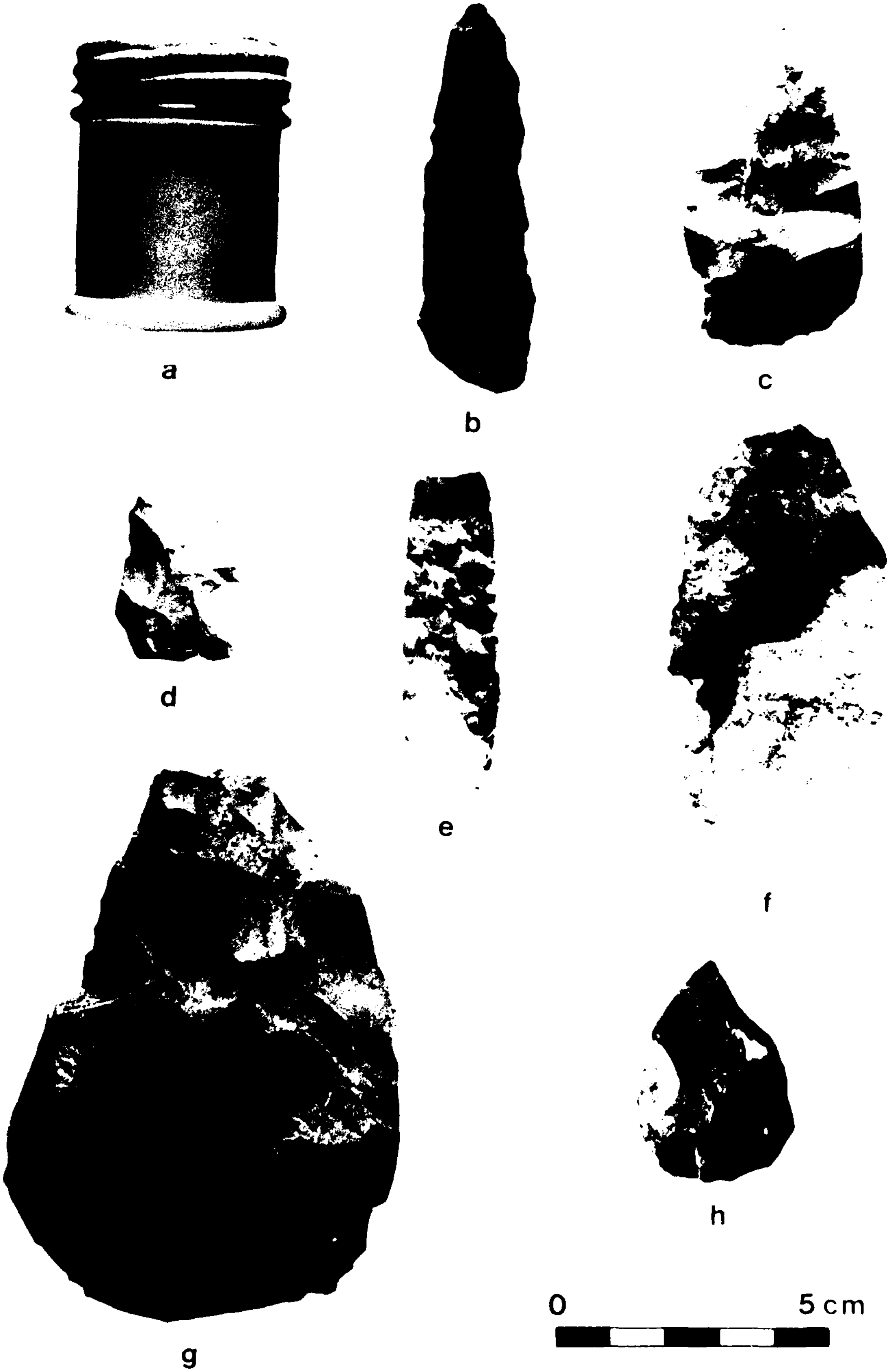


Figure 34. Artifacts from 23JA109 and 23JA137: (a) bottle from 23JA109, (b-c) bifaces from 23JA109, (d-e) projectile points from 23JA137, (f-h) bifaces from 23JA137.

Figure 35. Historic bottles and jars from 23JA109.

23JA137

Site 23JA137 is located in Longview Corps Tract 125. It is on the edge of the T-1 terrace about 120 m east of the Little Blue River at the base of a steep bluff (Fig. 31). The elevation of the site is 810 ft (247 m). The distribution of lithics in eroded roads on the site and its position on the terrace indicate that the site covers an area of approximately 1,000 sq m. Testing by Brown in 1976 (Brown 1977:83) recovered projectile points diagnostic of the Middle Woodland period and revealed cultural deposits down to the 25 cm level. The site has been impacted by the construction of two access roads which intersect on the site, and it was not possible to locate the datum placed on the site in 1976.

Description of Investigations

The 1979 testing was focused on determining if the remaining undisturbed area of the terrace had intact cultural deposits. Two one by one m test units were excavated in this portion of the terrace. Test Unit 1 was excavated in the area south of the intersection of the two roads, and Test Unit 2 was placed in a small undisturbed area near the terrace edge. Intensive surface reconnaissance of the terrace and the bluff slope was also performed. The surface collection revealed a scatter of lithic manufacturing debris in the road bed and eroded areas on the terrace, but no prehistoric cultural material was noted on the bluff slope above the site. Large quantities of unworked chert debris are eroding down the slope and were recovered both on the surface and from the test units.

The testing revealed a light deposit of cultural material extending to 60 cm below the surface in Test Unit 1 and to 50 cm in Test Unit 2. The stratigraphy in the two units was similar with a dark organic rich humus zone (Unit II) extending to about 15 or 20 cm and a light brown silty clay (Unit II) below this. Limestone chunks and pebbles were common throughout the deposits; they became very dense at about 10 cm in Test Unit 1 (Fig. 36). The amount of rock rubble and the position of the site at the base of a steep slope indicates that the deposits may have been affected by slope-wash and that much of the material is likely secondarily deposited.

The prehistoric material is thoroughly mixed with modern historic items to a depth of 40 cm in Test Unit 1 and 30 cm in Test Unit 2. Only a few prehistoric items were recovered below the historic material. No features, ceramics, faunal or floral remains, or datable carbon were recovered from the testing.

Artifact Assemblage

Cultural material recovered included projectile points, bifaces, edge-modified flakes and lithic manufacturing debris along with a large quantity of modern historic materials. Distribution of the material is shown in Table 11.

Table 11. Artifact assemblage recovered from 23JA137.

	TEST 1	UNIT 2	SURFACE	TOTAL
CHIPPED STONE TOOLS				
Projectile Points	2			2
Bifaces		2	1	3
Edge-Modified Flakes	10	5	2	17
Total	12	7	3	22
MANUFACTURING DEBRIS				
Cores		1	1	2
Debitage	14	23	58	95
Total	14	24	59	97
HISTORIC MATERIALS	11	5		16
TOTAL	37	36	62	135

Chipped Stone Tools

Projectile Points (n=2)

Two projectile points were recovered from the upper 10 cm of Test Unit 1. They are in direct association with a number of modern cultural items including several bricks, nails, glass and a silver-plate spoon. One of the points is a fragment of a corner-notched dart point of gray Winterset chert with wide notches and a straight base (Fig. 34d). It is similar to points which occur through the Late Archaic and Woodland periods, but is too fragmentary for more positive identification. The other projectile point is the proximal half of a Nebo Hill lanceolate of pink and white exotic chert (Fig. 34e). It is 60 mm long and has slightly convex blade edges and an incurvate base. It is similar to several of the points from 23JA170, a large Nebo Hill site on the bluff top directly above 23JA137.

Bifaces (n=3)

Two of the three bifaces came from Test Unit 2 and were roughly worked blanks of Argentine chert. One of these exhibited reddening over much of its surface, possibly indicating heat treatment. These are illustrated in Figure

34f-g. The third biface is a small fragment of Winterset chert (Fig. 34b) found on the surface.

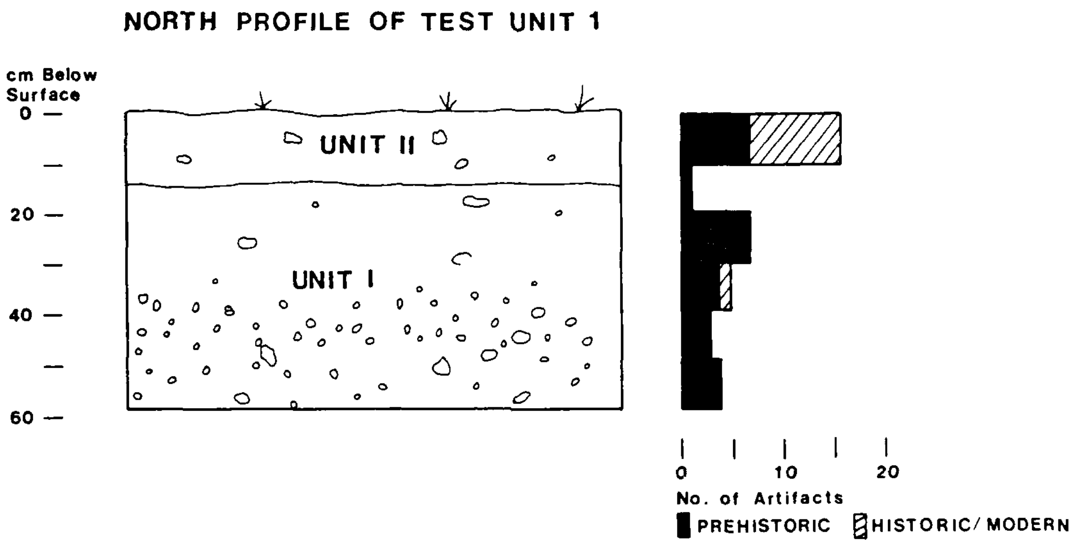


Figure 36. Profile and distribution of cultural material at 23JA137.

Edge-Modified Flakes (n=17)

The edge-modified flakes in the collection from 23JA137 included perforators, notches and small cutting and scraping tools. Of these 11 (65 percent) were tan Winterset chert, three (18 percent) were of exotic cherts, and the rest were gray Winterset chert.

Manufacturing Debris (n=97)

One core of dark gray Winterset chert was recovered from the upper levels of Test Unit 2, and one small Argentine core was recovered from the surface. The rest of the material was debitage, of which 34 percent was gray Winterset chert, 37 percent tan Winterset chert, and 26 percent reddened tan Winterset. There was also one flake of reddened gray Winterset chert and one of Westerville chert.

Historic Material

Modern Debris (n=16)

The historic material from the site consisted of bricks, nails, glass, a silverplate spoon, a bullet, crockery fragments and metal fragments. There is also much historic and modern material on the slope above the site where it appears that local people have been dumping trash for many years. The material on the site appears derived from this dumping.

Discussion

Brown (1977:83) assigned a Middle Woodland, Kansas City Hopewell, cultural affiliation to the site based on the projectile points recovered in 1976. The projectile points recovered in 1979 also indicate the presence of a Late Archaic occupation, although the fact that these artifacts are associated with modern bricks limits their reliability. There are other sites with Middle Woodland and Late Archaic components nearby. About 275 m to the northeast is site 23JA109, a Middle Woodland component, and just on top of the bluff is the south end of 23JA170, a large Nebo Hill site. It is possible that the occupations at 23JA137 represent small ancillary processing or procurement stations for these two sites, but the amount of material available and the degree of mixing of the amount deposits make impossible reliable determinations. There is evidence, in the form of lithic debitage, for chipped stone tool manufacture on the site, and small cutting and scraping tools indicate bone or wood working may have been taking place.

The possibility that 23JA137 was, in fact, a portion of the Woodland site to the north should be considered. The recent grading of the roads to the north allowed examination of this area however, and no evidence of such continuity was found.

The University of Kansas crews recovered charred seeds of grape (*Vitis* sp.), goosefoot (*Chenopodium* sp.), and smartweed (*Polygonum* sp.) from the site and postulated a fall occupation, but Brown noted that the seeds were from a shallow deposit and were not associated with any features (Brown 1977:83-84). No further seeds or faunal material were recovered during the 1979 work, so it is not possible to make reliable interpretations of the season of occupation or subsistence strategy represented.

Recommendations

The site seems to represent a small Middle Woodland and/or Archaic occupation of a terrace remnant. It has been heavily impacted by both natural and cultural factors including slopewash, erosion of the terrace, trash dumping and road construction, and little remains of the undisturbed deposits. The site appears to be similar to several other sites in the valley in having Late Archaic and Woodland components on the T-1 terrace. This fact, combined with its severely disturbed condition, indicates that it is not likely that further archaeological investigations would be warranted. The site is not considered significant, and no further work is recommended.

23JA143

Site 23JA143 is located in the Blue Springs Corps Tract 121 at an elevation of 780-790 ft. (238-241 m). There are two primary localitites of artifact distribution (Fig. 37). Locality I is at the base of a steep bluff about 350 m north of the East Fork of the Little Blue River. This area was tested by Brown in 1976; no cultural material was noted below a soil change which probably represents the plow zone. No features or diagnostic artifacts were recovered. Based on Brown's investigations and our work,

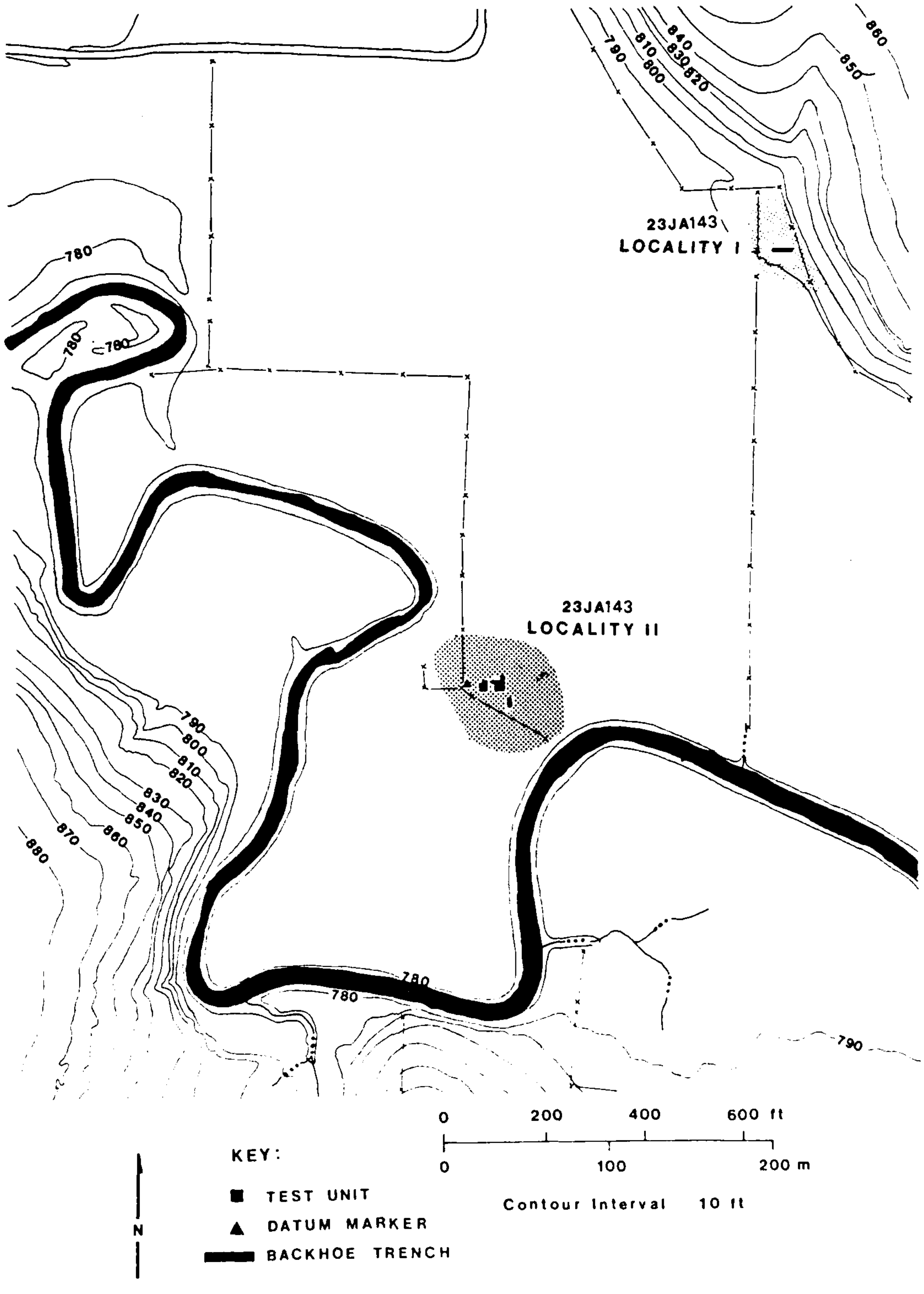


Figure 37. Location of Localities I and II at 23JA143.

it appears that this locality covers approximately 3,600 sq m around the base of the bluff. The 1979 work at Locality I was therefore limited to a surface collection of the cultivated portions of the area and backhoe trenching to examine the soil stratigraphy and look for possible deeply buried cultural deposits. Only a very light scatter of lithic debris, unworked chert fragments, limestone, and modern debris was recovered on the surface, and no cultural material was noted in the backhoe trench. The soil was a dark gray brown clay loam (plow zone) over a light brown clay unit which sloped downward toward the river.

Locality II is on a slight rise in the T-1 terrace on the north bank of the East Fork of the Little Blue (Fig. 37). It is approximately 300 m southwest of Locality I in a previously cultivated field. This locality appears to cover a maximum of 5200 sq m bound on the south and west by the edge of the T-1 terrace and the river. The present vegetation is heavy brush and willow thicket. The 1976 University of Kansas investigations consisted for 16 one by one m test units which revealed the presence of a relatively undisturbed stratum of cultural material and one hearth-like feature from which a sample of cultural material and one hearth-like feature from which a sample of charred seeds and one ceramic sherd was recovered. Based on the potsherd, Brown (1977:52) assigned a Middle Woodland, Kansas City Hopewell, affiliation to the site. This was confirmed by the recovery of additional ceramics and a radiocarbon date of 1620±70 B.P.

Description of Investigations

The 1979 testing concentrated on recovering further material from Locality II to provide additional data regarding the cultural affiliation and chronology of the site. Power equipment was utilized to remove the plow zone (approximately 20 cm) from an area 10 X 8 m in extent. This was located over the small block excavation from the 1976 testing (Brown 1977). Power equipment was utilized in order to facilitate location of the 1976 units and allow a larger area to be examined.

Eighteen one by one m test units were excavated in two blocks to the east and west of the area excavated in 1976 (Fig. 38), and a one by two m unit (Test Unit 4) was located to the southeast of the test blocks. The stratigraphy in the main blocks (Fig. 39) showed light colored sandy clay (Unit I). In the test unit to the south there was little discernable change, with the upper dark grayish brown alluvial clay (Unit II) becoming more blocky at about 20 cm (Unit IIa). The boundary is indistinct and probably represents an old plow zone (Fig. 39). Rodent activity was present throughout the deposit and a few historic metal fragments were recovered to a depth of 30 cm in the southwest area of the excavations, but, overall, the cultural deposit is relatively undisturbed.

Testing uncovered cultural material to a depth of 60 cm with the largest percentage in the 20-30 cm and 30-40 cm levels. No diagnostic chipped stone artifacts were recovered, and the lithic density was relatively light throughout the site.

No definite features were located in the 1979 testing, but several areas of higher artifact density were noted in the distribution. There are at least

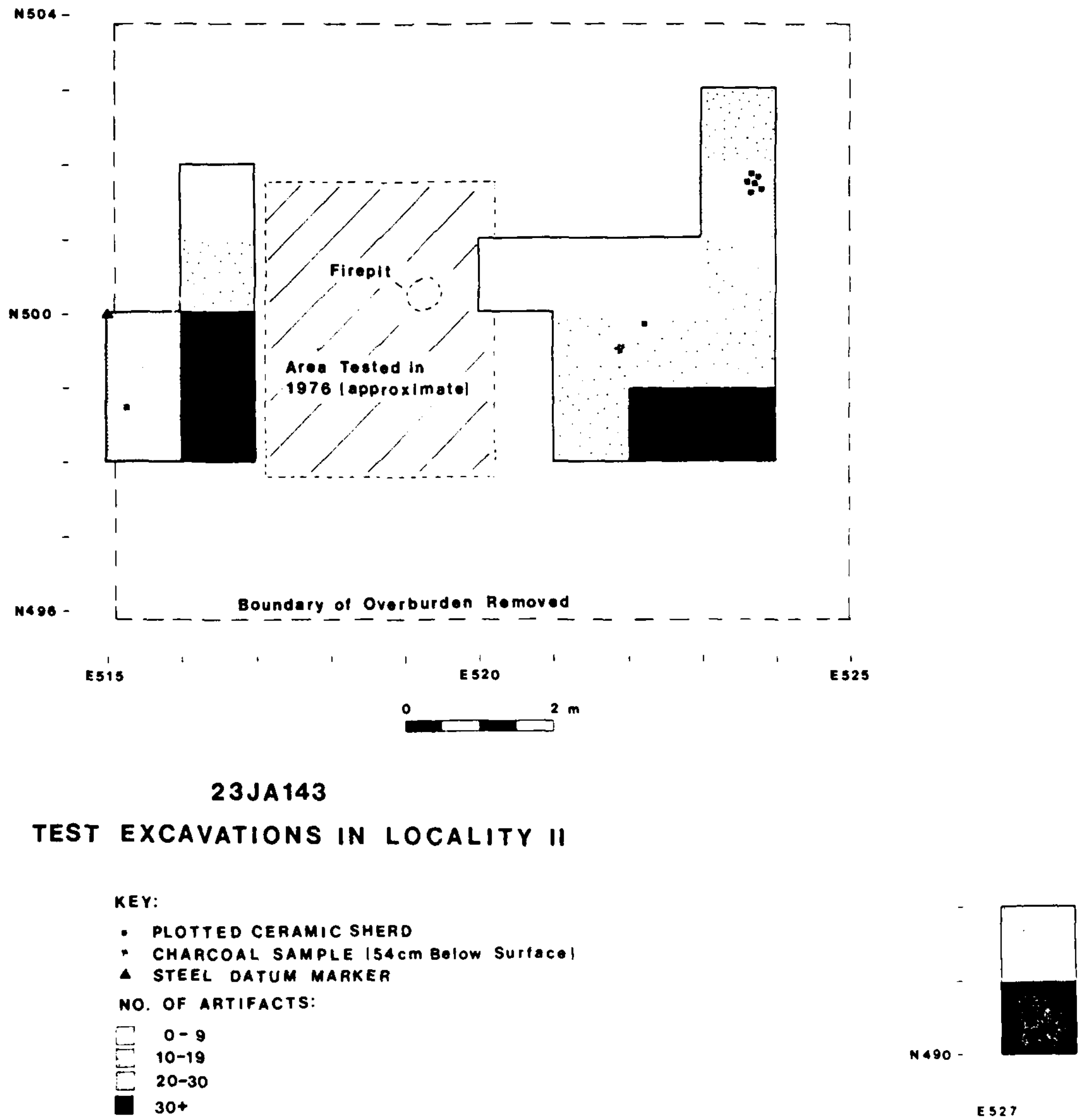
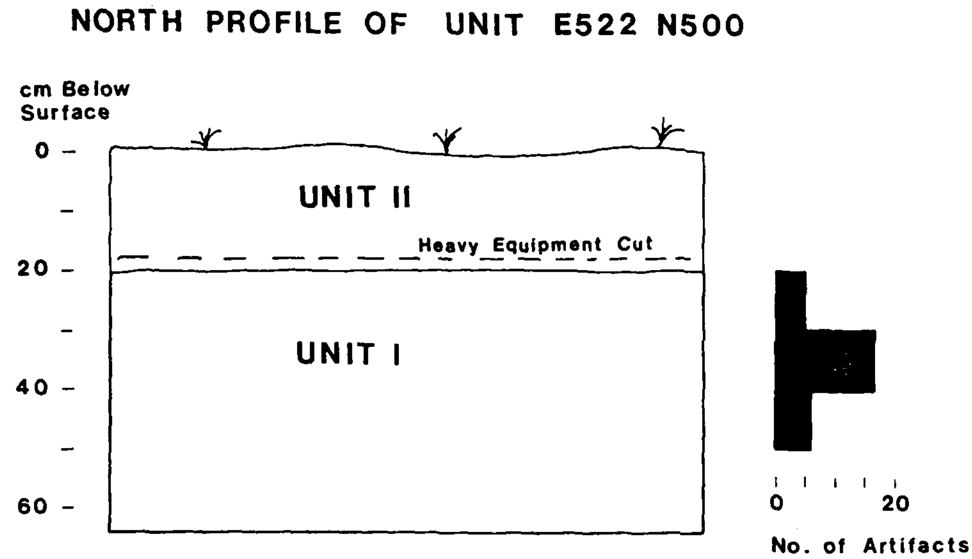


Figure 38. Plan view of test excavations at 23JA143. Squares at bottom right show peripheral area tests in relationship to major text excavation area.



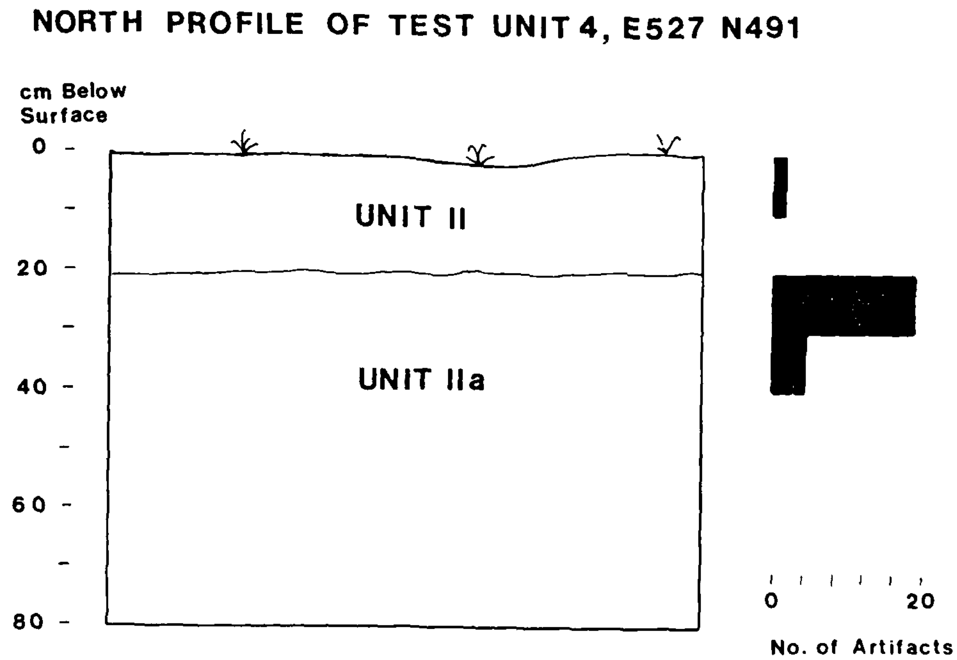


Figure 39. Profiles and distribution of artifacts at Locality II of 23JA143.

two areas of relatively higher debitage density and one with a high density of tools and pottery (Fig. 38).

Radiocarbon Dating

A radiocarbon date of 1620±70 B.P. years or A.D. 330 (DIC-1683) was obtained on charcoal recovered from near the base of the cultural deposit. The sample was a single large piece of burnt wood from E521, N499 at a depth of 1.69 m BD (approximately 54 cm below surface).

Artifact Assemblage

The cultural material recovered from 23JA143 includes ceramics, bifaces, edge-modified flakes, lithic debitage and faunal and floral remains. Fragments of several ceramic vessels were recorded, but lithic density in both tools and debitage is low (Table 12).

Ceramics

Body Sherds (n=28)
Twenty-eight body sherds, but no rimsherds, were recovered from the test units. All 28 are plain-surfaced, and the majority have blackened interior surfaces. Three categories can be recognized, based on the temper utilized. The first group is tempered with a fine grit which appears to be crushed granite (Fig. 40a). There were only two such sherds recovered, and both exhibited a grayish brown surface finish. They were 6.5 and 7 mm in thickness. The second category consisted of only one sherd which was tempered with coarse crushed granite with plainly visible mica and feldspar (Fig. 40b). The surface and paste were both reddish orange, and the sherd was 8 mm thick.

The third category was the most numerous, with 24 examples making up 89% of the sample. The temper is a coarse angular sand or crushed quartzite. The particles are large and easily visible in the paste and on the surface of the sherds (Fig. 40c). There is no evidence of feldspar or other minerals in the temper. These sherds range from 4 to 10 mm in thickness, but much of the variation in thickness appears to be the result of differential thickness within the same vessel. Several large sherds vary several mm in thickness from one end to the other. One fragment of this type was a portion or a strap of lug handle. Most of this type sherd showed an orange surface, but a few of the thinner examples had gray or light brown surfaces. In all three types the temper generally makes up less than 10 percent of the matrix. The ceramic categories noted here are based on relatively minor variations in the temper and do not represent major technological differences. They probably represent only variations in the sources of tempering material or the degree to which it is broken up after procurement. No evidence of broken or crushed granite or quartzite which could indicate ceramic manufacture, was noted in the testing.

Eleven of the sherds exhibit definite charring or blackening on the interior surface. This charring probably indicates cooking or food preparation activities at the site.

Table 12. Artifact assemblage recovered from 23JA143.

	EXCAVATION LEVEL								SURFACE		
	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	LOCALITY I	LOCALITY II	TOTAL
CERAMICS				9	19						28
CHIPPED STONE TOOLS											
Bifaces				3	1						4
Edge-Modified Flakes			3	5	2					6	16
Total			3	8	3					6	20
MANUFACTURING DEBRIS											
Cores				1							1
Debitage	3	1	142	165	52	10	1	1	9	50	434
Total	3	1	142	166	52	10	1	1	9	50	435
HEARTHSTONE				3							3
MINERALS									1	1	2
FAUNAL REMAINS				1	1	1					3
FLORAL REMAINS	1				1						2
HISTORIC MATERIAL				6					4	3	13
TOTAL	4	1	145	193	76	11	1	1	14	60	506

Figure 40. Artifacts recovered from 23JA143: (a-c) ceramics, (d-f) bifaces.

Chipped Stone Tools

Bifaces (n=4)

Four bifaces were recovered from the excavations. One is a small bifacially worked Winterset chunk which has wear indicating use as a chopping tool (Fig. 40d). This includes battering and heavy step fracturing of the working edge. Another is a roughly worked lanceolate of Argentine chert with a unifacially retouched tip which appears to have been utilized as a scraper (Fig. 40e). There is also the tip of a small, well made biface which may have been a projectile point (Fig. 40f) and a small bifacial edge fragment. The latter are both of Winterset chert.

Edge-Modified Flakes (n=16)

These were generally quite small, averaging less than 27 mm in length. They included utilized projections, notches and small cutting and scraping tools.

Manufacturing Debris (n=435)

One small Winterset chert core was recovered from the site. It measures 47 mm X 39 mm X 33 mm and weighs 107.8 g. The rest of the material is lithic debitage. Only nine flakes were recovered from Locality I; the rest came from the excavations at Locality II. Non-Winterset chert made up only five percent of the sample but included both exotic cherts and Argentine. No primary reduction flakes were recovered on the site. Nearly all of the debitage was tertiary stage material indicating that little primary reduction was taking place at this location.

Other Lithic Tools

Hearthstone (n=3)

Three fragments of reddened limestone were recovered from the area east of the 1976 test units. These may indicate that stones were utilized in conjunction with the hearth excavated by Brown (1977:52).

Minerals (n=2)

Two small, rounded lumps of limonite were recovered at 23JA143. One each came from the surface at Locality I and Locality II. Neither show signs of being worked, and both are probably non-cultural items.

Faunal Remains

Unworked bone (n=3)

Faunal remains from the 1979 testing consisted of two fragments of unburnt bone and one very small fragment of burnt bone. None of the pieces is identifiable, but the size of one of the pieces of unburnt bone indicates a large mammal such as deer.

Floral Remains

Floral remains consist of one charred nut of bitternut hickory (*Carya cordiformis*) and a large unidentified seed fragment. The latter was recovered from within the plow zone is likely recent in origin.

Historic Material

Historic debris (n=13)

Historic items were recovered from both localities. Locality I had a scatter of glass, crockery and metal fragments on the surface, while Locality II contained only small rusted wire or nail fragments, one piece of tin and a 22 caliber cartridge.

Discussion

23JA143 is a single component Middle Woodland occupation on what is likely a terrace remnant near the edge of the present flood plain. The majority (70 percent) of the cultural material is from the 20-40 cm levels with scattered material extending to 60 cm. The site probably represents a single occupation which occurred in a relatively short span of time.

The presence of several ceramic fragments with black organic stains on their interior, a number of small unifacial cutting tools and burnt and unburnt bone indicate that food processing or cooking was taking place at the site. The presence of a hearth with charred seed remains provides further evidence for this conclusion. The seeds reported by Brown (1977:52) represent five genera: hazelnut (*Corylus* sp.), hickory (*Carya* sp.), bedstraw (*Galium* sp.), hackberry (*Celtis* sp.) and panic grass (*Panicum* sp.). Based on the seasonal availability of these species, Brown (1977:52) suggests a summer and fall occupation for the site. Recovery of a charred hickory nut from the cultural deposits in 1979 also argues for a fall occupation.

There is no evidence that primary lithic manufacture or ceramic manufacture was taking place on the site. The lithic debitage is almost entirely tertiary flaking debris and only one core was recovered. This indicates that most of the tools were made from blanks or preforms which had been quarried and prepared at some other location. No pieces or concentrations of the tempering material utilized in the pottery from the site were recovered at 23JA143. Such material would constitute the most convincing evidence for ceramic manufacture at the site, and its absence indicates that such manufacture probably occurred elsewhere.

Activity areas, in the form of higher densities of tools, ceramics or lithics, are present at the site, but it is not possible at this time to determine the tasks to which they are related. More detailed spatial analysis will require that larger areas of the site be opened up for examination.

Recommendations

Site 23JA143 is one of a small number of Middle Woodland sites in the Little Blue area which exhibit intact subsurface deposits. Floral and faunal remains are known to exist at the site as well as intact cultural features. These factors make possible the testing of settlement and subsistence models proposed for this time period. Data from this site viewed in conjunction with that from the Woodland component at 23JA238, which has a nearly identical

date, could greatly refine the picture of the Middle Woodland adaptations in the Kansas City area.

The relationship between 23JA143 and 23JA238 poses a number of research questions. 23JA238 has a high percentage of lithics and few ceramics while 23JA143 has the opposite. Does this represent functional differences between the sites, or is this due to sampling bias in the excavations? The relationship between these camps and Middle Woodland occupations in the Kansas City area is important as far as questions of subsistence and settlement in this time period are concerned. 23JA143 is to be inundated by Blue Springs Lake. Recommended mitigation options include extensive excavation of Locality II to recover as much data as possible prior to the filling of the lake. These investigations should be oriented around the recovery of perishable materials and features and make use of heavy equipment to open up a large area to search for possible structures.

23JA158

Site 23JA158 is located on a ridge top approximately 500 m northeast of the East Fork of the Little Blue River. It is in Blue Springs Corps Tract 146. The site is at an elevation of 850-900 ft (259-274 m). The site consists of a light scatter of lithic debitage in a 3,200 sq m area on top of the ridge (Fig. 41). The northern half of the site has been disturbed by construction of a house, outbuildings and a pond. Surface collection in 1976 revealed a light scatter of flakes and tools but no diagnostic artifacts were recovered (Brown: 1977:60-61). The site is presently in pasture with some wooded areas remaining. Present vegetation patterns appear to be the result of recent human influence.

Description of Investigations

Testing in 1979 was conducted to determine if significant subsurface deposits existed in the site and to recover diagnostic artifacts or carbon for dating. Seven one by two test units were excavated to a depth of 40-80 cm on the ridge top. The soil was a dark grayish-brown silt loam (Unit II) over a dark brown clay (Unit I). The transition was between 25 and 33 cm in all units and may represent an old plow zone (Fig. 42). Rodent activity was noted in the soil along with a lot of small roots. Subsurface cultural material was absent or very limited over most of the site. There was one small area near the crest of the ridge where a moderately heavy deposit of cultural material was recovered to the 40-50 cm level. Modern cinder was found to a depth of 30 cm, however. No cultural features, diagnostic artifacts, ceramics, faunal or botanic remains or datable carbon were recovered from the testing.

Artifact Assemblage

The artifacts from 23JA158 consisted entirely of lithic tools and manufacturing debris. These included bifaces, edge-modified flakes, cores and debitage (Table 13).

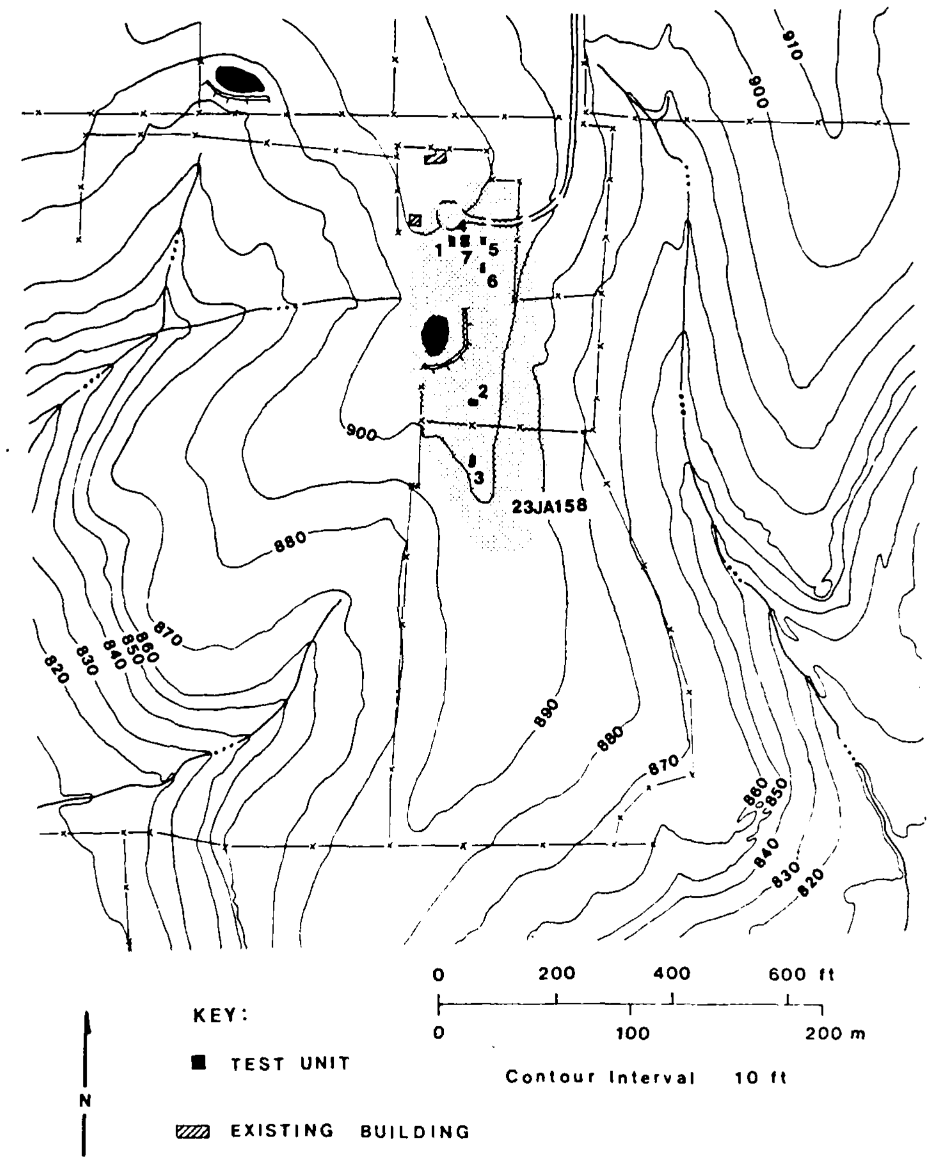


Figure 41. Location of 23JA158.

Table 13. Artifacts recovered from 23JA158.

	TEST UNIT						SURFACE	TOTAL
CHIPPED STONE TOOLS								
Bifaces					1	1		2
Edge-Modified Flakes			3	1		2		6
Total			3	1	1	3		8
MANUFACTURING DEBRIS								
Cores	2				1		6	9
Debitage	5	1	46	8	6	29	33	128
Total	7	1	46	8	7	29	39	137
HISTORIC MATERIALS	1	2	3	12	57	3	8	86
TOTAL	8	3	52	21	65	35	47	231

Bifaces (n=2)

The bifaces included the tip of a roughly worked biface blank (Fig. 43a) and a small irregular biface fragement (Fig. 43b). Both were made of Winterset chert.

Edge-Modified Flakes (n=6)

A total of six edge-modified flakes were recovered from the site. One of these was a notch and seven exhibited small cutting or scraping type edges. One tool was quite large (66 mm) and had two edges with attrition and step fracturing on them. All of the edge-modified flakes were made of Winterset chert.

Manufacturing Debris (n=137)

Eight cores of gray Winterset chert and one of tan Winterset were recovered. Three came from the test units and the rest were on the surface. The rest of the material was made up of flakes, chunks and shatter. There was a large quantity of unworked chert fragments and pieces on the surface of the site and there appeared to be some of the tan Winterset type chert included in this. Most of the debitage could have come from locally available materials.

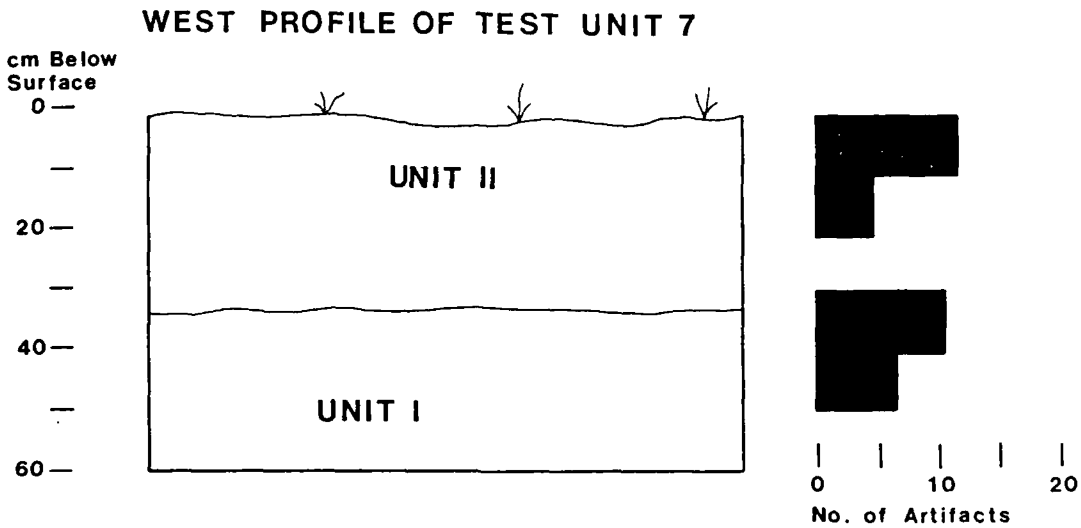


Figure 42. Profile and distribution of artifacts at 23JA158.

Historic Material

Historic Debris (n=8)

A small sample of historic debris including a horeshoe, glass and plastic fragments and crockery were recovered from the surface of the site.

Cinder (n=78)

A large quantity of modern coal cinder was recovered from the test unit. The largest amount came from the upper 40 cm in Test Unit 6, but all of the test units which had any material in them had some cinder in the upper levels.

Discussion

23JA158 appears to contain only one small area on the crest of the ridge which has buried cultural material. This deposit is light and shows no evidence of producing significant information. The lack of ceramics could argue for an Archaic cultural affiliation, but there is not sufficient data available to make an assignment. The site is similar in location and in extent of surface scatter to Archaic sites such as 23JA160 and 23JA35, but it contains far less cultural material than either of these. 23JA158 may represent a series of short term occupations possibly related to exploitation of edge environments in the prairie/forest interface and of locally available Winterset chert. The primary activity represented is lithic tool manufacture. The historic component at the site is related to a modern farm. The buildings

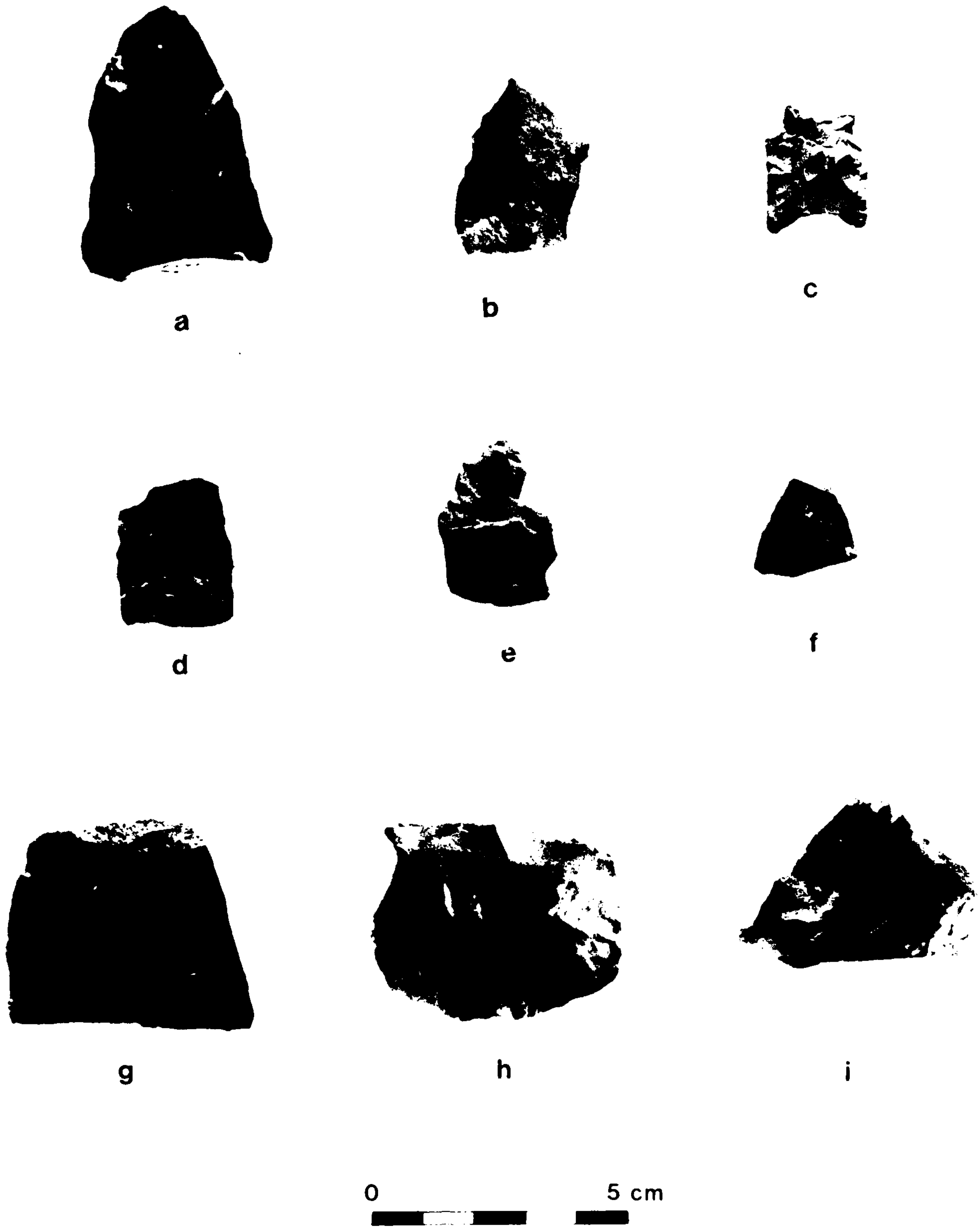


Figure 43. Artifacts from 23JA158 and 23JA160: (a-b) bifaces from 23JA158, (c-e) projectile points from 23JA160, (f-i) bifaces from 23JA160.

are now gone but were standing in 1969 when aerial photographs were taken in the Blue Springs area.

Recommendations

Site 23JA158 covers a large area on top of a ridge, but the density of cultural material is quite low. No diagnostic artifacts were recovered from the site, and it is not possible to assign a cultural affiliation. The low density of cultural material over most of the site makes it unlikely that further investigations would be able to provide significant data. The site is not considered significant, and no further work is recommended.

23JA160

Site 23JA160 is located on the top of the bluff on the east side of the East Fork of the Little Blue River. It extends onto the top of a wooded ridge and is bound on three sides by steep slopes. It is in Blue Springs Corps Tract 106. The site is at an elevation of 850-900 ft (259-274 m). It covers an area of approximately 41,800 sq m (Fig. 44).

The east half of the site has been cleared in the past and is now in pasture and brush and the west half of the site is heavily wooded. Surface reconnaissance in 1976 recorded a lithic scatter in a roadbed running the length of the ridge and testing revealed a shallow sub-surface deposit at the east end of the site area. Brown (1977:41-43) also reports recovery of a Dalton-like projectile point from the surface (Fig. 43c) and suggests an Early Archaic cultural affiliation for the site.

Description of Investigations

In 1979 the site was arbitrarily divided into six collection localities numbered from west to east. The relatively open areas of the site were brush-hogged and disced to improve surface visibility. A series of 49 shovel tests were excavated and mapped, and an intensive surface collection was made over the disced areas. These investigations revealed a light surface scatter which covers most of the crest of the ridge and extends well into the wooded area on the west. Five one by two m test units were excavated, and these revealed only a very light deposit of subsurface material, located mainly in the 0-20 cm levels below the surface.

Test Units 1 and 2 were located in the wooded area on the top and north slope of the ridge in this area. The soil (Fig. 45) was a dark brown organic rich zone (Unit II) over a fine textured orange brown clay loam (Unit I). The upper zone was approximately 20 cm in depth and contained most of the cultural material. These two units contained 4 and 5 flakes respectively. The three units in the cleared area to the east exhibited a fine light brown sandy silt zone (Unit I) over the same orange-brown clay loam (Unit II) (Fig. 45). Only Unit 5 contained any cultural material, and this was in the upper 20 cm in the

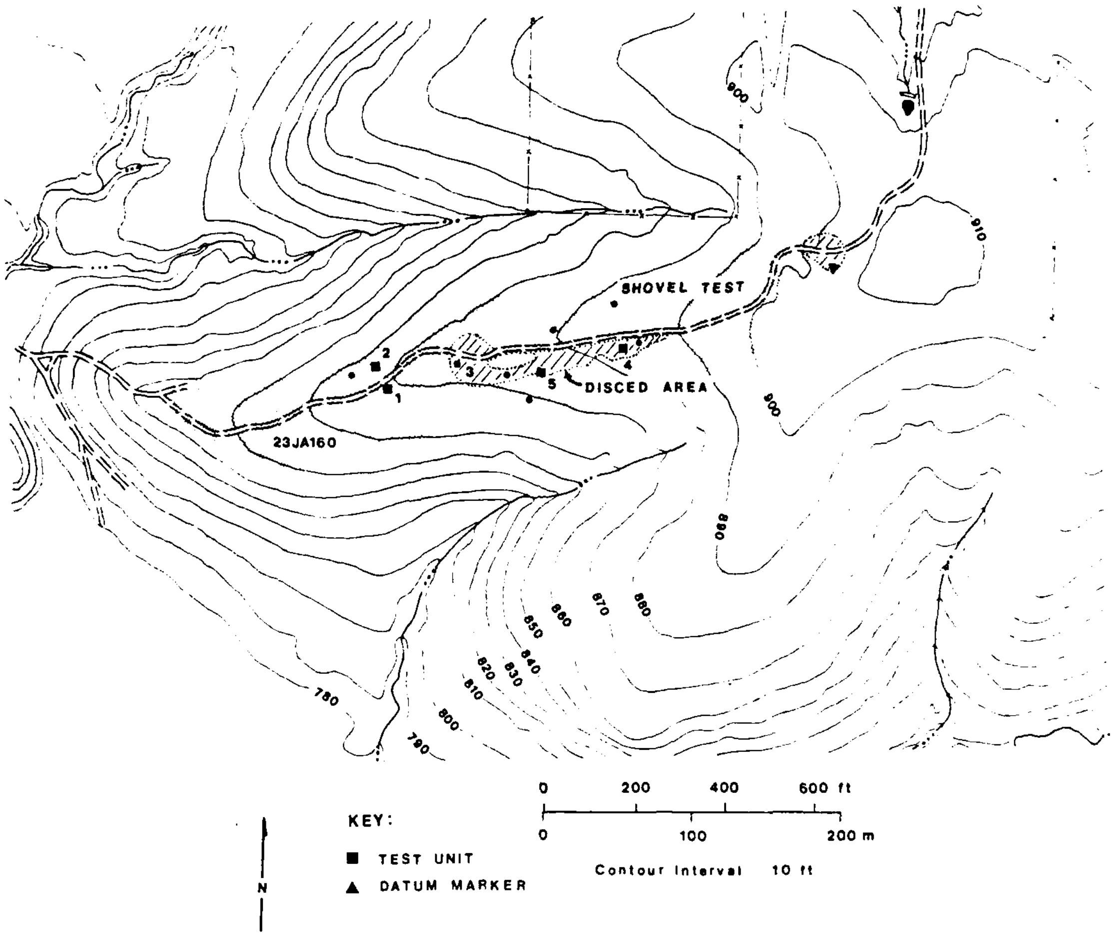


Figure 44. Location of 23JA160 and test investigations.

sandy silt. No features, ceramics, faunal or floral remains or datable carbon were recovered from the site.

Subsequent to the testing of 23JA160, road construction activities in conjunction with an EPA sewerline project uncovered a deposit of cultural material at the base of the bluff immediately below the west end of the site. Projectile point fragments diagnostic of the Late Archaic or Middle Woodland were recovered from the site. This site has been recorded as 23JA191.

Artifact Assemblage

The majority of the artifacts recovered from the site came from the surface collection. The cultural material consists entirely of chipped stone tools and manufacturing debris. Table 14 illustrates the distribution of cultural material on 23JA160.

Table 14. Artifact assemblage recovered from 23JA160, Line Site.

	TEST UNIT 1	TEST UNIT 2	TEST UNIT 5	SURFACE	TOTAL
CHIPPED STONE TOOLS					
Projectile Points				2	2
Bifaces				4	4
Edge-Modified Flakes				5	5
Total				11	11
MANUFACTURING DEBRIS					
Cores				1	1
Debitage	4	5	3	111	123
Total	4	5	3	112	124
TOTAL	4	5	3	123	135

Projectile Points (n=2)

The surface collection from the 1979 work included the base of a lanceolate point (Fig. 43d) similar to the Late Archaic Nebo Hill materials and a fragment of a small heavily reworked stemmed or side-notched point of pink chert (Fig. 43e).

Bifaces (n=4)

Four biface fragments were recovered from the surface of the site (Fig. 43 f-i). Two of these were proximal portions of large thin lanceolates with straight bases, one was a fragment of a probable projectile point and the other was the tip of a large lanceolate or ovate biface blank. All were of Winterset chert.

Edge-Modified Flakes (n=5)

Five edge-modified flakes were recovered from the site. There was one perforator, one notch and three small cutting or scraping tools. Edge-modified flakes made up a relatively small percentage of the cultural material at this site as compared to many other sites in the area.

Manufacturing Debris (n=124)

Winterset chert was the predominant material type in the debitage sample, and 95 percent of the flakes were tertiary reduction flakes. Only one core, of local Winterset chert, was recovered.

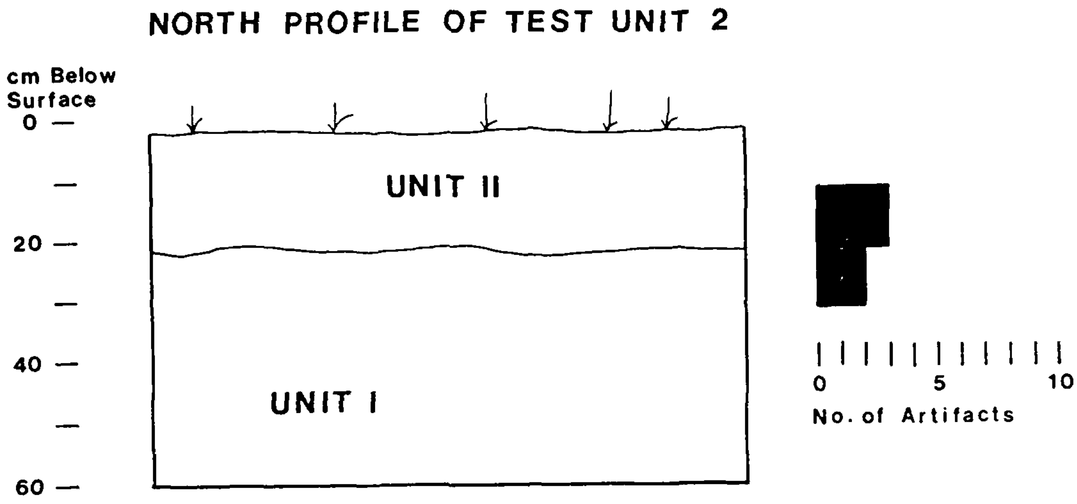


Figure 45. Profile and distribution of artifacts at 23JA160.

Discussion

Based on a small sample of projectile points, the site appears to represent a series of Early and Late Archaic occupations. The low percentage of tools suggests that a limited range of activities took place at the site, but this may be the result of differential prehistoric utilization of site areas and the relatively small percentage of the site area which could be sampled. The test excavations indicate that the site contains only a very shallow deposit of cultural material and no areas of high artifact density. The presence of a possible Early Archaic component at the site makes it significant since this is a little known cultural period in the Little Blue River Basin. The site has potential for answering questions regarding cultural chronologies and intrasite spatial relationships. It is likely that large areas of the site would have to be examined below the surface to produce this information, however. Plowing of large areas of the ridge top might provide one means of doing so as the deposits appear to be relatively shallow.

Recommendations

The presence of a possible Early Archaic component makes Site 23JA160 significant since this is a poorly documented cultural period in western Missouri. The shallow nature of the deposits limit the types of data which could be recovered from the site, but it is possible that relatively undisturbed cultural materials exist in the western portion of the site. The site does show potential for answering some questions of chronology and intra-site patterning.

The recommended mitigation option for 23JA160 is preservation. If this is not possible, data recovery investigations should be considered. This could take the form of extensive plowing, mapping and surface collection of the ridge top to try to delineate spatial relationships and obtain a better set of diagnostic materials to provide more detailed chronological information.

23JA161

The site is located in Blue Springs Corps Tract 108 at an elevation of 870-900 ft (265-274 m). It consists of two distinct lithic concentrations and another less dense scatter of debitage in a cultivated field on a bluff top on the east side of the East Fork of the Little Blue River. The site covers approximately 54,000 sq m.

A small collection of debitage and one Waubesa-like projectile point were recovered in the 1976 surface reconnaissance (Brown 1977:45). On the basis of the projectile point, Brown assigned the site a Late Archaic or Middle Woodland cultural affiliation (Brown 1977:45).

Description of Investigations

Surface reconnaissance revealed the presence of two distinct concentrations of lithics with a very light scatter of material on most of the north end of the field as shown in Figure 46. The concentrations were located on the two highest points on the field and are approximately 220 m apart. The eastern concentration, Locality I, is a few m higher than Locality II. Locality I is approximately 20 by 30 m in size and Locality II is about 20 by 50 m. Both areas exhibited high densities of cultural material.

A single one by two m test unit was excavated to a depth of at least 50 cm in each of these localities and a third unit in an area approximately 250 m south where a large core was recovered. The entire site area was surface collected with the two localities used as collection units. The plow zone in all three test units extended to at least 35 cm and in many places on the surface of the field the lighter colored clay from the lower soil zone could be seen where it had been plowed up. The soil in all three test units (Fig. 47) showed up as a dark brown clay in the plow zone (Unit II) which was directly underlain by a lighter tan clay with occasional limestone and chert pebbles (Unit I).

Test Unit 2 at Locality I recovered cultural material to the 40-50 cm level. Five pieces of debitage were recovered from this level, indicating that there is at least a light deposit of cultural material below the plow zone in this area. Test Unit 2, in Locality II, did not produce any cultural material below the plow zone and only a light deposit of material within it. Test Unit 3, in the southern area of the field, produced no cultural material.

The surface and testing collections include lithic tools which indicate early occupation of the bluff top. Locality I produced projectile points,

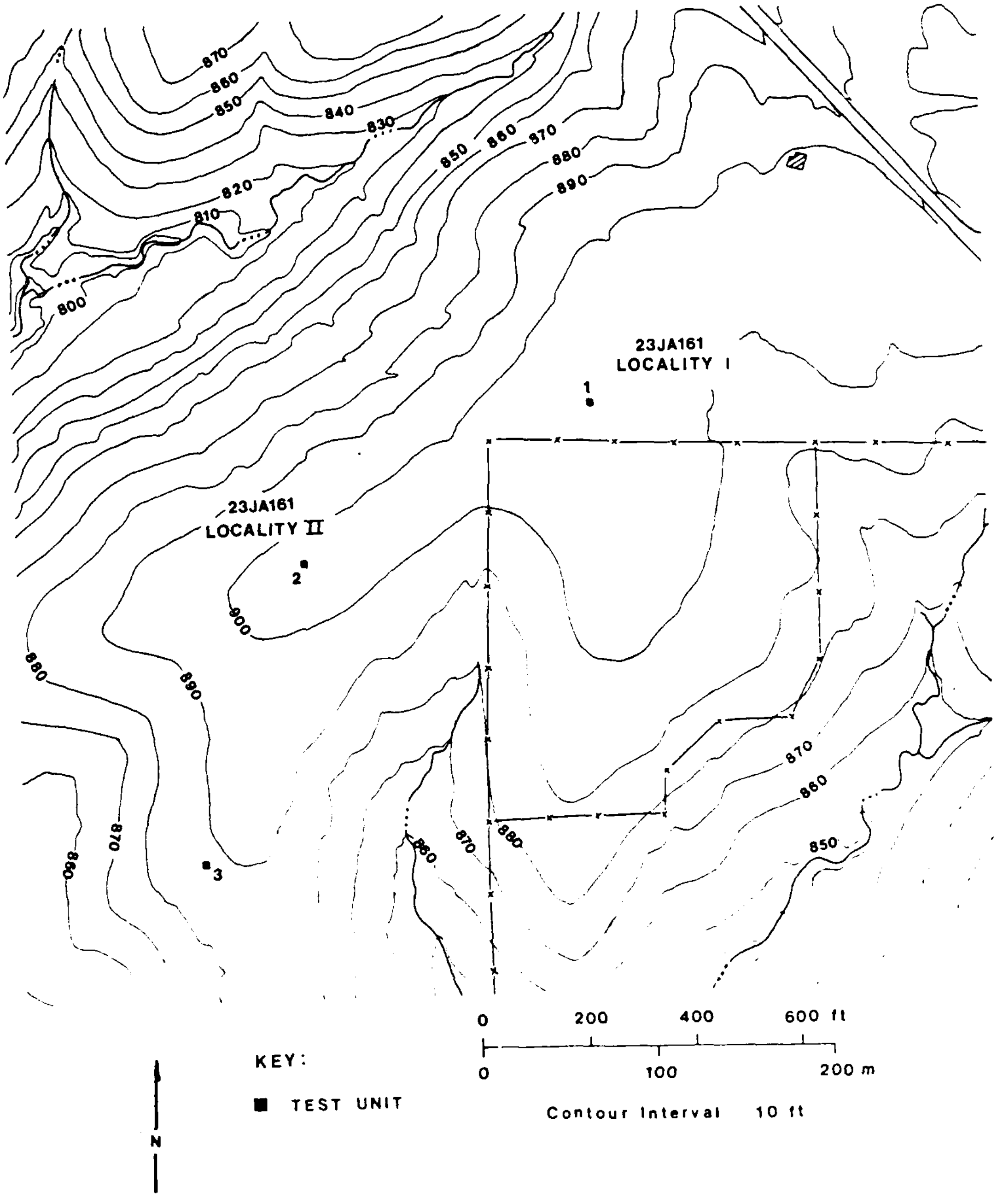


Figure 46. Location of Localities I and II at 23JA161.

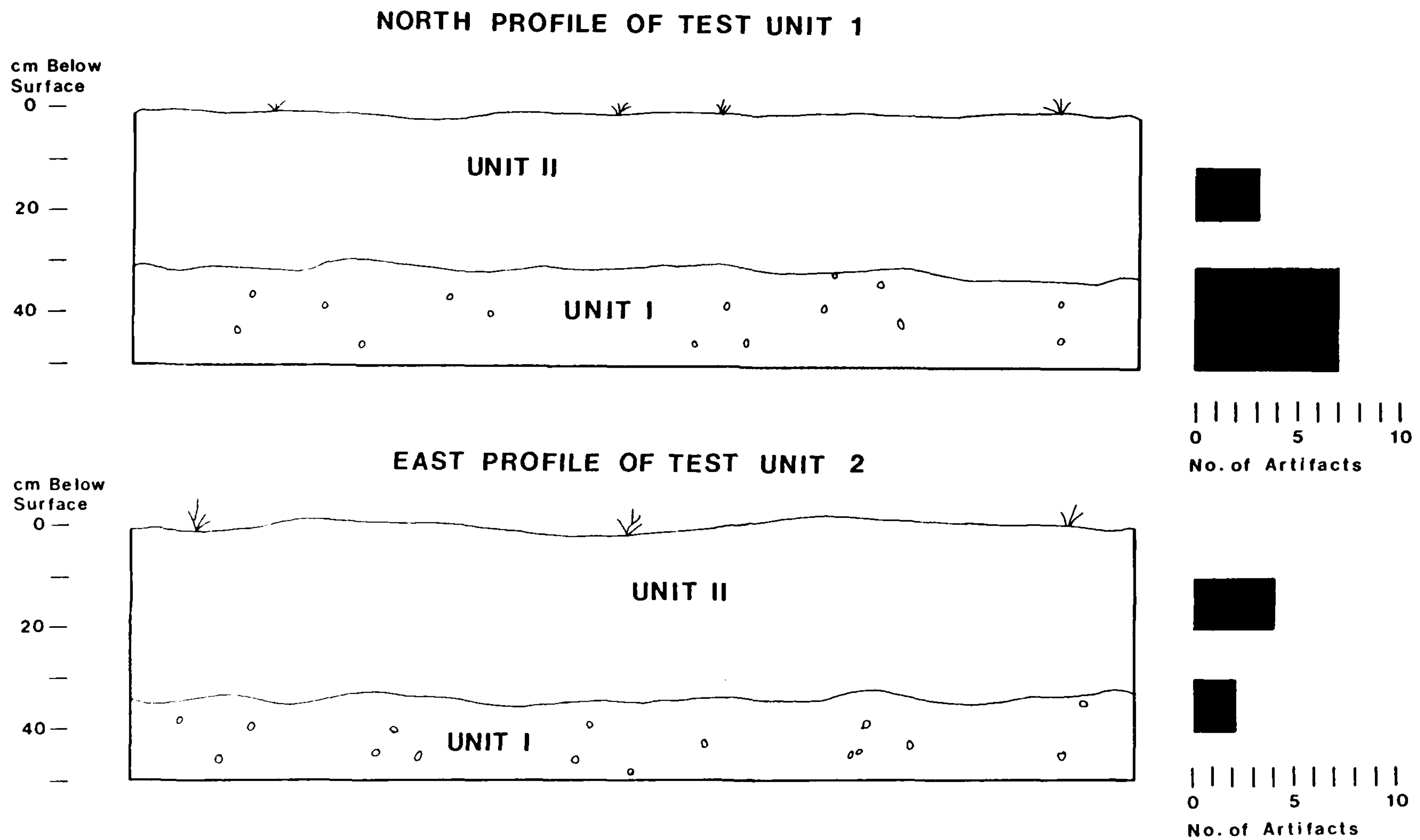


Figure 47. Profiles and distribution of cultural material at 23JA161.

bifaces and retouched flakes in addition to cores and debitage. Locality II produced a very large lithic collection including ten bifaces, a unifacial scraper, four end-scrapers, and two-edge modified flakes. Evidence of internal spatial patterning was noted in this area in the form of a concentration of four large biface blanks which came from an area approximately five by five m on the east end of the locality. No other features were noted on the site. No ceramics, faunal or floral remains or datable carbon were recovered from 23JA161.

Artifact Assemblage

23JA161 contained a large and widely varied assemblage of artifacts. This included projectile points, bifaces, endscrapers, edge-modified flakes, and lithic debris. The range of items recovered exceeds that of most of the other sites in the project area. Table 15 presents the artifact distributions for the site.

Table 15. Artifact assemblage recovered from 23JA161.

	TEST UNIT 1	TEST UNIT 2	SURFACE Locality I	SURFACE Locality II	GENERAL SITE AREA	TOTAL
CHIPPED STONE TOOLS						
Projectile Points			2		1	3
Bifaces			2	10		12
Unifaces				5		5
Edge-Modified Flakes	1		6	20	2	29
Total	1		10	35	3	49
MANUFACTURING DEBRIS						
Cores			5	2	2	9
Debitage	13	6	105	488	1	613
Total	13	6	110	490	3	622
HISTORIC MATERIALS	2				1	3
TOTAL	16	6	120	525	7	674

Chipped Stone Tools

Projectile Points (n=3)

In 1979 the distal portion of a large parallel-sided point with carefully serrated blade edges (Fig. 48a) was recovered from Locality I. The point

appears to have been corner-notched and has a slight flaring just above the notch. It is similar to an Early Archaic point referred to as Graham Cave notched (Chapman 1975:137). A second point from this locality is a Nebo Hill-like point which has been reworked into a drill (Fig. 48b). The third point (Fig. 48c) recovered in 1979 was a small corner-notched dart point similar to some recovered from Late Archaic context at the Snyder and Coffey sites in eastern Kansas (Grosser 1977:47-51; Schmits 1978, 1980) and to others of the Late Woodland (Martin 1976: 33-40; Shippee 1967:33-36). It was recovered from approximately 75 m northeast of Locality II.

Bifaces (n=12)

Two small biface blanks or preforms were recovered from the surface of Locality I. One is the tip of a thin lanceolate (Fig. 48d); the other is the base of a small shattered lanceolate with a straight base (Fig. 48e). Ten bifaces or biface fragments were recovered from the surface in Locality II. Four of these, found in a small area on the east end of the lithic concentration, were heavy duty biface blanks of Winterset chert (Fig. 48f-i). They were all between 7.5 and 10 cm in length and in a similar stage of productions. None had any evidence of marginal retouch other than platform preparation. Another bifacial tool was made from a tabular piece of Winterset chert which had one bifacially flaked working edge and exhibited battering on its proximal end where it formed a narrow, natural stem (Fig. 48j). It appears to have been hafted in some manner at this end. Other bifaces included the basal section of a thin, finely retouched lanceolate which has finely normalized working edges and appears to have been utilized as a knife (Fig. 48k), tiny fragments of the midsection and a tip of a projectile point, the tip and base of two small lanceolates (Fig. 49a-b) and a roughly worked ovate blank (Fig. 49c).

Unifaces (n=5)

Locality II produced four small end scrapers (Fig. 49d-g), two of Winterset and two of non-local cherts. The largest of these measured 32 cm in length. These represent a high percentage of the sample of the end scrapers from the tested sites in the Little Blue Valley. There was also a large unifacially worked flake which exhibited four utilized edges and a utilized projection.

Edge-Modified Flakes (n=29)

Locality II also had a relatively large collection of edge-modified flakes, with 20 examples recovered from the surface. These included small cutting or scraping tools and perforators or gravers.

Six edge-modified flakes were recovered from the surface of Locality I. All of these had straight working edges. The test unit produced one tool with straight and one concave working edge. Three other edge-modified flakes were recovered from the general site surface.

Manfacturing Debris (n=622)

Two Winterset chert cores and 488 pieces of lithic debitage were recovered from Locality II and five Winterset cores and 105 flakes from Locality I. One large core of Winterset chert was also recovered from the south

Figure 48. Projectile points and bifacial tools from 23JA161: (a-e) projectile points, (f-k) bifacial tools.

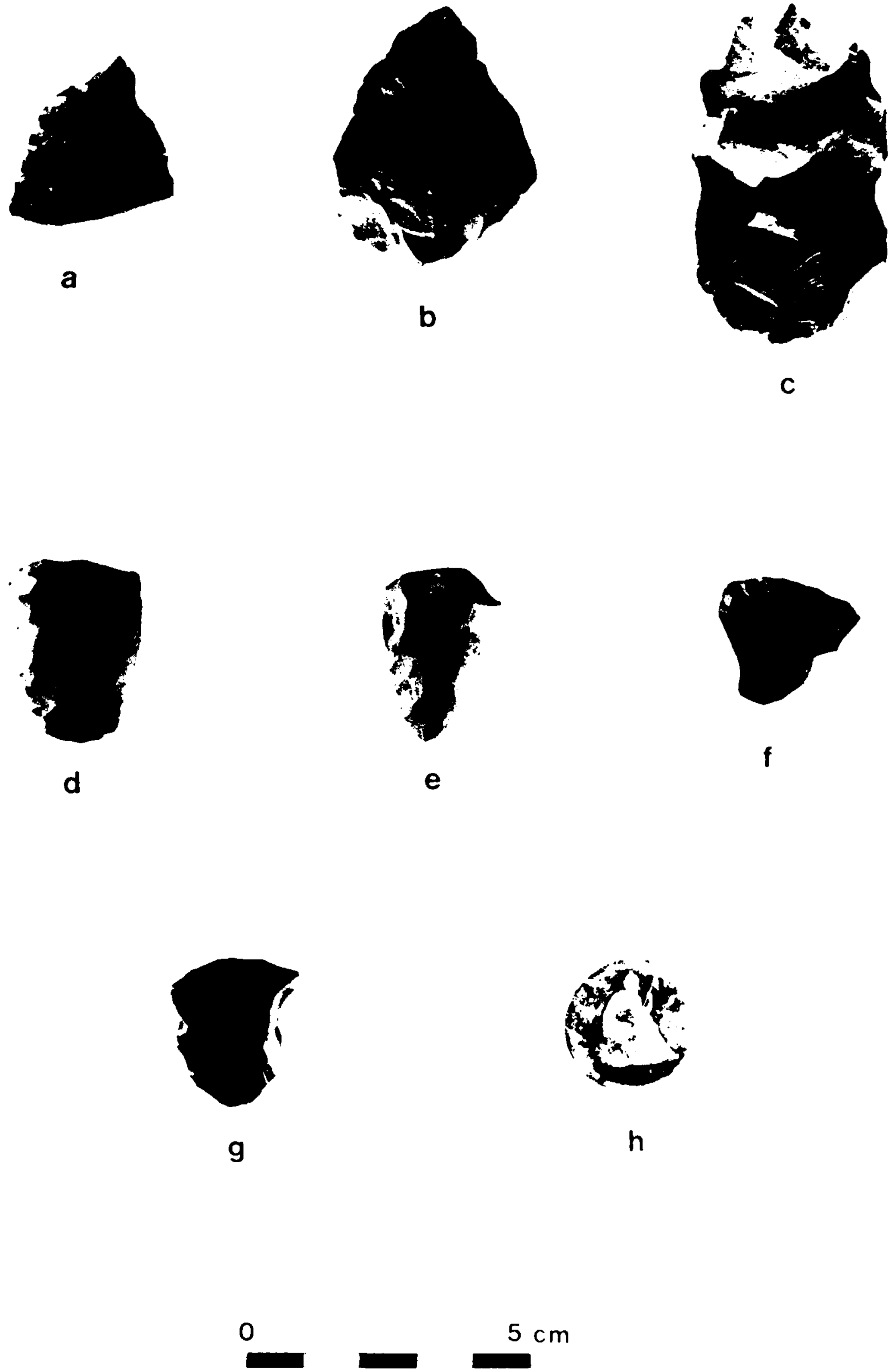


Figure 49. Artifacts recovered from 23JA161: (a-c) bifaces, (d-g) unifaces, (h) 1876 Liberty Seated Quarter.

portion of the field. The predominant lithic material was Winterset chert with very little or any other material represented in the debitage sample. Nearly all was tertiary stage debris.

Historic Material

Coin (n=1)

One 1876 Liberty Seated quarter (Fig. 49h) was recovered from the south edge of the plowed field. It is in relatively poor condition and appears to have been circulated for a number of years prior to deposition in the site. It has a San Francisco mint mark.

Modern Debris (n=2)

This material consisted of one bottle cap and a small metal fragment. They both were recovered from the base of the plow zone in Test Unit 1.

Discussion

23JA161 appears to contain two components, separated both spatially and chronologically. Locality I appears to be an Early or Late Archaic manifestation whose small size indicates a short term occupation by a small group. Activities represented include lithic tool manufacture, hunting, heavy duty perforating or drilling and cutting and scraping activity. The latter may represent meat removal or wood or bone tool manufacture.

Locality II appears to represent an intensive occupation of the top of a small knoll and a diverse set of prehistoric activities. The cultural affiliation of this locality is not definite. There are projectile points from the site which indicate either Woodland or Late Archaic components, but these are not directly associated with the lithic concentration. The four large biface blanks recovered from the surface of Locality II are similar to some in local collections from Woodland sites in the area. Activities represented include lithic tool manufacture, cutting and scraping activities and hide working. The latter activity is indicated by the presence of endscrapers, which were a relatively unusual tool type for the area.

23JA161 is a significant site in that it exhibits evidence of a more diverse set of activities than other sites in the Little Blue Lakes Project area. Locality I appears to retain intact cultural material below the plow zone and evidence of an Early Archaic occupation. Locality II does not appear to have intact cultural deposits, but its diversity of cultural material and the density of the surface scatter indicate an intensive occupation of this area. The site has potential for answering questions regarding both the chronology and settlement patterns of the Little Blue Valley. Further subsurface work at Locality I and additional surface collection at Locality II would provide valuable data about prehistoric occupation of the area. Settlement information about the Early Archaic cultural period is particularly valuable in light of the poor representation of this cultural period in the archaeological record of the Little Blue River drainage.

Recommendations

23JA161 is a significant, National Register eligible site and contains evidence of a relatively dense concentration of cultural material of a poorly represented cultural complex. The distribution of cultural material over the site and within the concentrations exhibits definite patterning which could provide valuable clues to the activities performed on the site. It also exhibits a much more diverse set of artifacts representing a wider range of activities than do most of the sites in the Little Blue project area. The question of placement of Locality II chronologically and its relationship to other sites in the area should be examined in more detail than was possible during the test excavations. There may be significant early cultural deposits intact in Locality I which could provide valuable settlement and subsistence data regarding the Early Archaic.

The recommended mitigatioı. option for 123JA161 is preservation. The planning for the site area calls for the construction of picnic areas and a road, with associated parking areas. The entire site should be avoided if possible, but it would be feasible to avoid only the areas of the two lithic concentrations and allow them to grow up in vegetation. This would effectively preserve them from visitor damage, provided that the site area is not marked or identified.

23JA162

Site 23JA162 is a lithic scatter located in Blue Springs Corps Tract 102. Its elevation is 790-800 ft (241-244 m), and it covers an area of approximately 7400 m^2 at the base of a steep bluff on the flood plain of the Little Blue River. It is in a field which has been cultivated for many years. The 1976 work consisted of the collection of material from the surface in 10 m gird units. At this time a large sample of lithic materials was collected, and a set of artifact distribution maps were developed. Based on the surface distribution, Brown (1977:10-11) hypothesized that the site was eroding off the bluff slope.

Description of Investigations

In order to test this hypothesis, a number of shovel tests were initiated on the slope. A large amount of unworked Winterset chert was recovered from these tests but no culturally modified material was fo' ıd. One previously unrecorded rockshelter was located on the bluff above the site, and shovel testing demonstrated the existence of cultural material just below the surface beneath the overhang.

Subsurface testing of the flood plain area consisted of excavation of two one by one m test units and placement of three backhoe trenches for stratigraphic examination and to look for deeply buried deposits (Fig. 50). The backhoe trench ran in a north-south line from the bluff slope out into the cultivated field. It showed a light tan crumbly clay with abundant chert pebbles and cobbles (Unit I) on the bluff slope (Fig. 51). This unit dipped

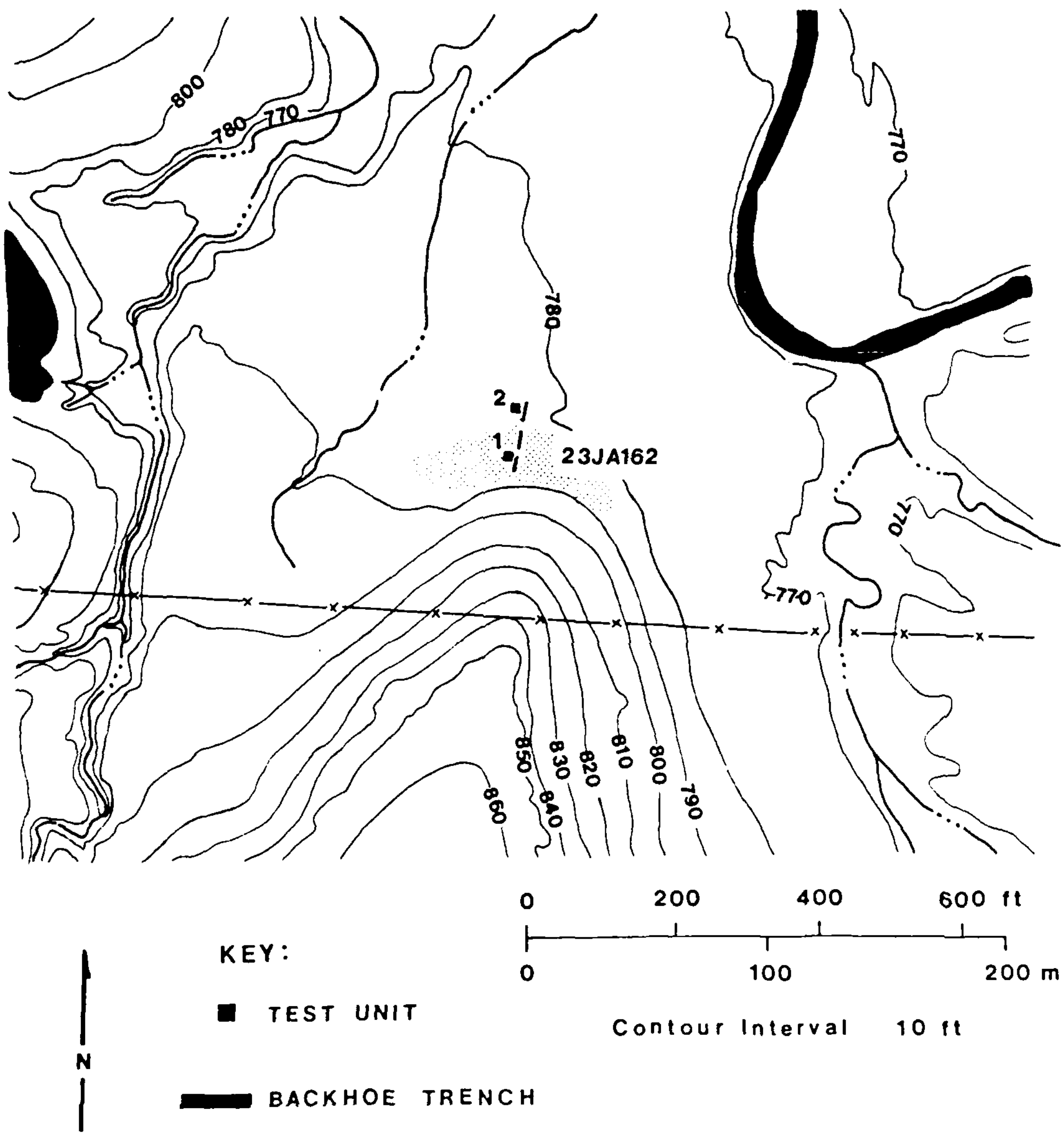


Figure 50. Location of 23JA162 showing the placement of test units and backhoe trenches.

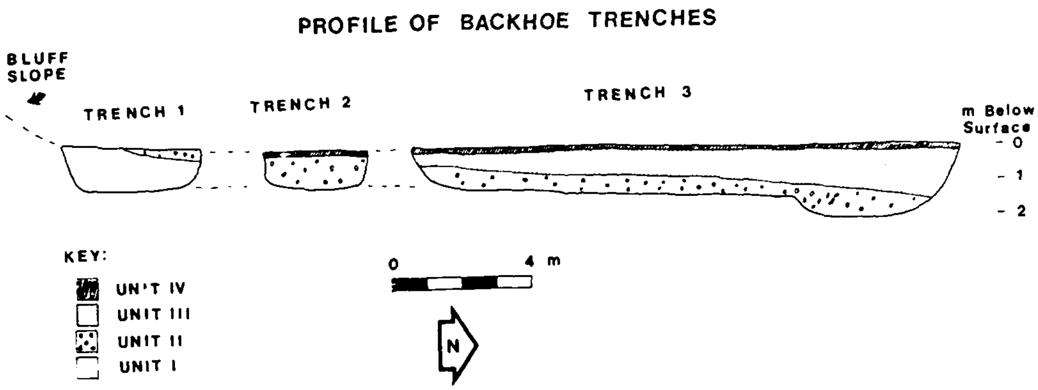


Figure 51. Profiles of the backhoe trenches at 23JA162.

downward with distance from the slope. Over this was a reddish clay with chert pebbles and cobbles (Unit II), containing reddish flecks of oxidation. This deposit is quite similar to the T-1 terrace fill at the other sites in the Little Blue Valley. This unit was overlain by a dark, gray black alluvial clay (Unit III). The plow zone was relatively deep (30-35 cm) over the whole cultivated field.

The cultural material is generally associated with Unit II where it is exposed on the surface near the base of the bluff. Very little cultural material was recovered from further out in the field where Unit III is on the surface.

Artifact Assemblage

The artifacts from 24JA162 consisted of chipped stone tools, lithic debitage, one hammerstone, faunal material and one historic artifact (Table 16).

Chipped Stone Tools

Bifaces (n=1)
A single ovate biface fragment of Winterset chert (Fig. 52b) was recovered from the surface of the site.

Edge-Modified Flakes (n=4)
Four edge-modified flakes were recovered from the surface of the site. Three of these had wear patterns consisting of unidirectional attrition and step fracturing, indicating probable scraping utilization, and the other was a small non-retouched utilized projection (Fig. 52c). The latter exhibited tip

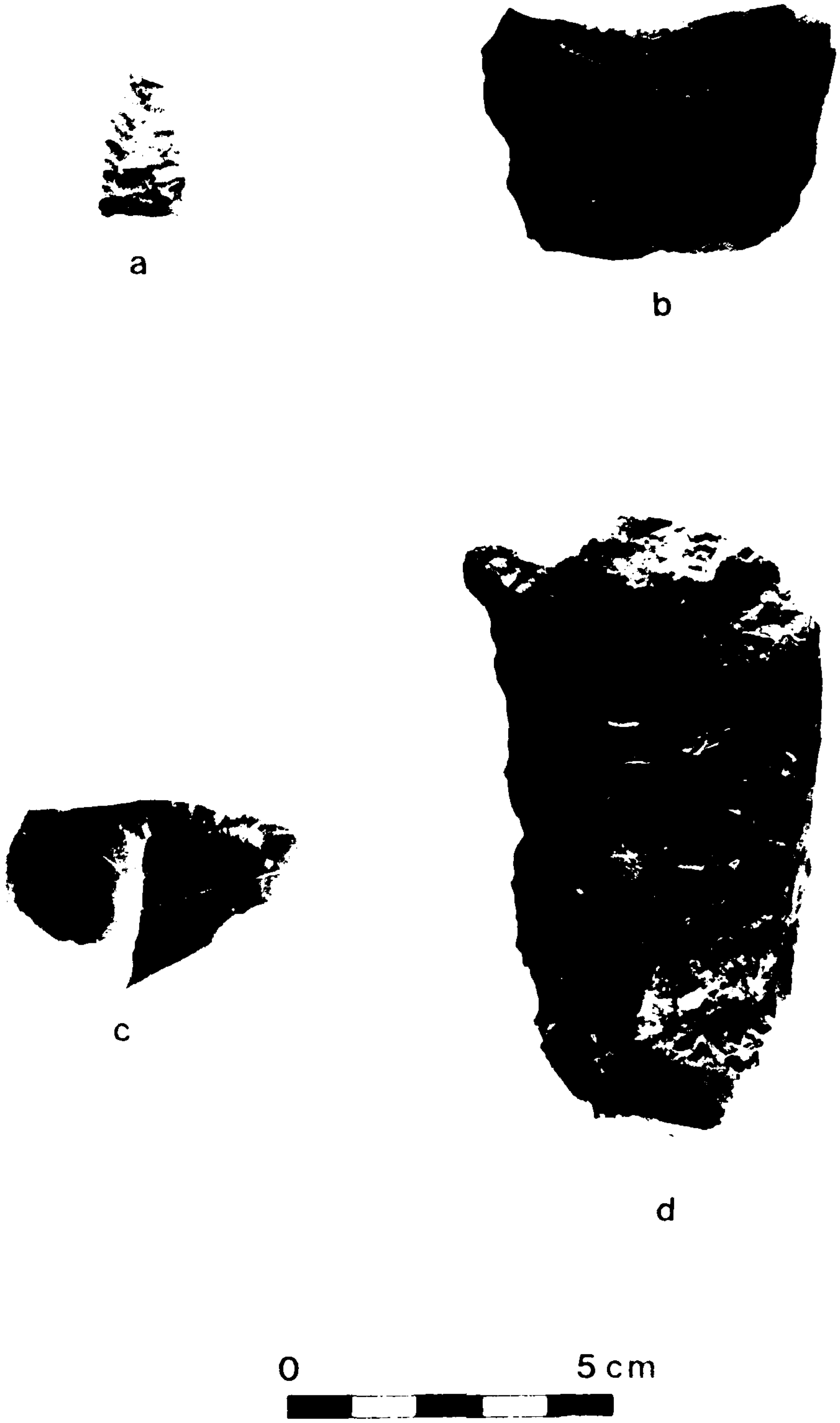


Figure 52. Artifacts from 23JA162 and 23JA163: (a) projectile point from 23JA163, (b) biface from 23JA162, (c) edge-modified flake from 23JA162, (d) hammerstone from 23JA162.

wear indicating utilization as a graver or perforator. All of these tools were of Winterset chert.

Manufacturing Debris (n=51)

Three small cores and 48 pieces of debitage of Winterset chert were recovered from the area near the base of the bluff and the west edge of the site. There is a great deal of unworked and weathered chert over the site as a result of erosion off the bluff slope. Most of this material is a light tan in color and occurs in small to medium sized angular fragments.

Table 16. Artifact assemblage recovered from 23JA162.

	GENERAL SURFACE	TOTAL
CHIPPED STONE TOOLS		
Bifaces	1	1
Edge Modified Flakes	4	4
Total	5	5
MANUFACTURING DEBRIS		
Cores	3	3
Debitage	48	48
Total	5	5
HAMMERSTONES	1	1
FAUNAL REMAINS	6	6
HISTORIC REMAINS	1	1
TOTAL	64	64

Hammerstones (n=1)

One hammerstone of a greenish brown, weathered chert (Fig. 52d) was recovered from the surface. It is 96 mm long, 47 mm wide and 23 mm thick and exhibits rounding and possible battering on one end. It weighs 130.3 g, and there is slight evidence of flaking along one edge.

Faunal Remains

Unworked Bone (n=5)

Bones of several small mammals were recovered from the surface of the plowed field. Their context, however, renders them unreliable as indicators of prehistoric activity.

Unworked Shell (n=1)

One fragment of mussel shell was recovered from the surface of the plowed field. Its context does not allow reliable interpretation, however.

Historic Material

Historic Debris (n=1)

One large metal strap was recovered from the surface. It looks like a tractor part and is likely related to cultivation activities on the site.

Discussion

The site appears to be a small occupation which is confined to the old terrace surface at the base of the bluff. It is not possible, on the basis of the cultural material recovered, to assign a cultural affiliation to the site. The tool inventory of the site is mainly comprised of very generalized flake tools and could represent a wide range of activities, but the presence of the hammerstone argues for lithic tool manufacture as one of them. Although there is chert eroding out to the bluff slope, it does not appear that it was being utilized. None of the flakes recovered in 1979 were of this local material. It does not appear to be particularly well suited for flintknapping.

Recommendations

Cultivation has effectively destroyed the subsurface integrity of the site, and two seasons of intensive surface collection have largely eliminated the evidence of the occupations. There appears to be no diagnostic material at the site, and further work is unlikely to increase significantly the data base for the site. It has been adequately investigated by the work performed to data and is not considered significant. No further work is recommended.

23JA163

23JA162 is in Blue Springs Corps Tract 100 at an elevation of 790-820 ft (241-250 m). The site is located on a ridge slope and is exposed by a tributary stream valley. The site consists of two widely separated areas: Locality I at the mouth of the valley, and Locality II, farther up the valley on the terrace of the stream (Fig. 53). Brown (1977:11-16) noted cultural material eroding out ot the ravine at the base of the slope. No diagnostic artifacts were recovered and it was not possible at the time to locate the extent of the site. Due to the extreme separation of the two localities, the investigations will be discussed separately.

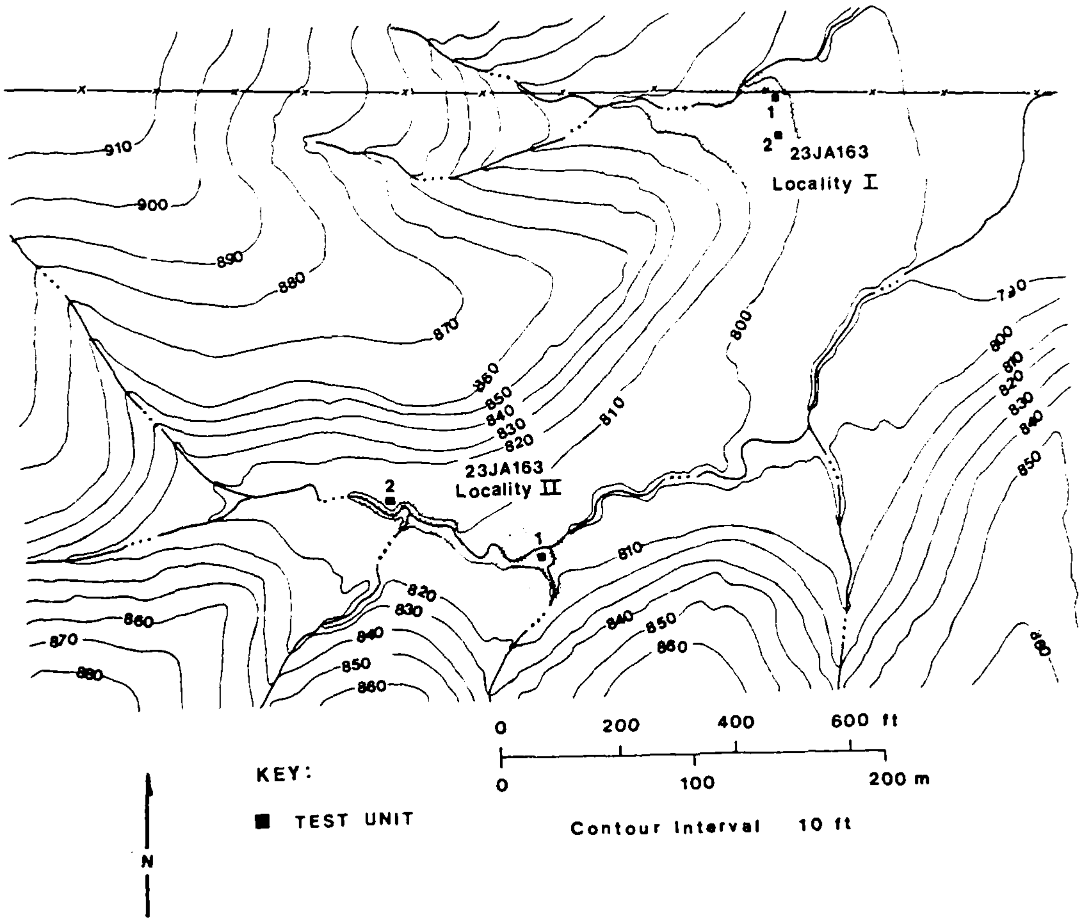


Figure 53. Location of Localities I and II at 23JA163.

Description of Investigations at Locality I

Locality I is located on a grassy slope and the flat area at its base. A road or trail runs up the slope and cultural material is eroding out of the roadbed. Surface collection on the hillslope and the eroded portions of the flat resulted in the recovery of a small sample of flakes and five Winterset chert cores. Additional cultural material was recovered from the sides and bottom of a ravine which cuts through part of the flat. The debitage scatter is light and there are numerous pieces of unworked chert eroding from the hillslope. Locality I covers approximately 8500 square meters on the slope and the flat below.

Two one by two m tests were excavated in Locality I to test for buried cultural deposits. These units were taken to 60 cm but cultural material was restricted to the upper 30 cm. The soil (Fig. 54) was a dark brown silty loam (Unit II) with an indistinct transition to a lighter clay below 30 cm (Unit I). Occasional unworked chert fragments were present in all levels of both units. No features, ceramics, floral or faunal remains, or datable carbon were recovered.

Artifact Assemblage from Locality I

The artifact assemblage at Locality I consisted of a single projectile point, three edge-modified flakes, and lithic manufacturing debris probably related to quarrying activities on the slope above. The distribution of this material is shown in Table 17.

Projectile Points (n=1)

A distal section of a tan exotic corner-notched chert arrow point (Fig. 52a) was found on the surface of the slope. Its form and size are similar to the Late Woodland Scallorn points or the Mississippian Reed side-notched point (Chapman 1980), but it is too fragmentary for positive assignment.

Edge-Modified Flakes (n=3)

The only other chipped stone tools recovered from Locality I were three edge-modified flakes, two of which were found on the surface. These were small cutting or scraping tools.

Manufacturing Debris (n=43)

There were less than a dozen pieces of lithic debitage recovered from the test units, and most of these were chunks or shatter fragments. One small Winterset core was also recovered from the 10-20 cm level in Test Unit 2. The rest of the debitage was from the surface of slope and the ravine. Five Winterset cores were recovered from the hill slope above the ravine.

Description of Investigations at Locality II

Locality II is approximately 275 m southwest of Locality I on the terrace on both sides of a small tributary of the Little Blue River. Based on the extent of the lithic scatter it appears to cover an area of about 5500 square meters. Within Locality II there are two areas, approximately 50 m apart,

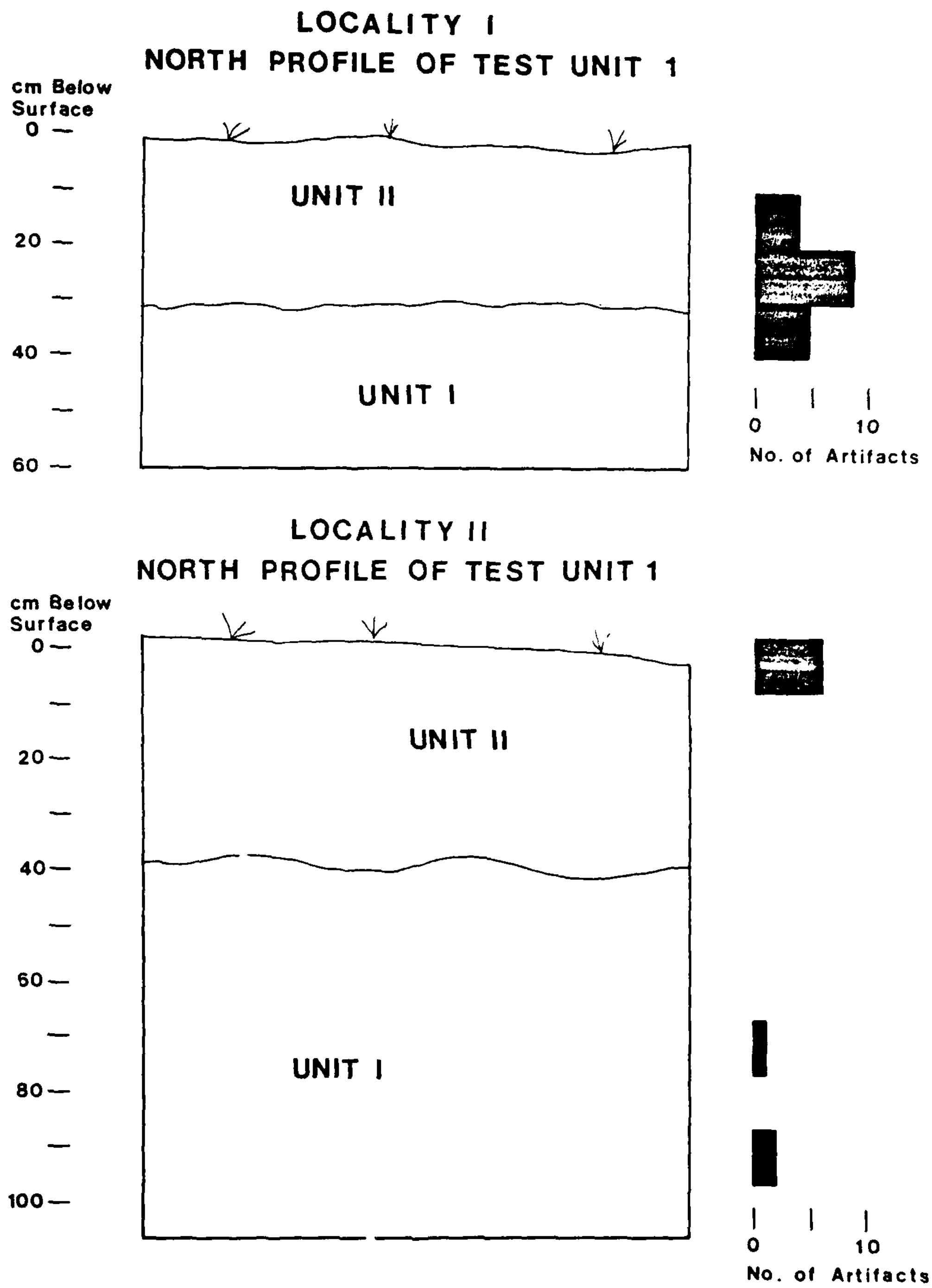


Figure 54. Profiles and distribution of artifacts at 23JA163.

Table 17. Artifact assemblage recovered from 23JA163.

	LOCALITY I		LOCALITY II		CUT BANK PROFILE	TOTAL
	TEST UNITS	SURFACE	TEST UNITS	SURFACE		
CHIPPED STONE TOOLS						
Projectile Points		1				1
Bifaces				2		2
Edge-Modified Flakes	1	2		5		8
Total	1	3		7		11
MANUFACTURING DEBRIS						
Cores	1	5				6
Debitage	10	27	5	8	10	60
Total	11	32	5	8	10	66
TOTAL	12	35	5	15	10	77

where debitage was found eroding out of the creek bank (Fig. 53). A one by two m test unit was excavated in each of these areas, and the cutbank was profiled in the Eastern one. The soil in this area was a relatively uniform grayish brown silt loam (Unit II) with an indistinct transition to a somewhat lighter brown (Unit I) at about 40 cm below the surface. The latter extended to a depth of 110 cm (Fig. 54). A very light deposit of cultural material was noted in Test Unit I. It extended to a depth of 100 cm but consisted of a total of five pieces of lithic debitage. Additional material was recovered from the creek bank profile. No cultural levels were discernable in either the test unit or the profile.

Test Unit 2 was located on the north bank of the creek in an area which appeared undisturbed. Part of the unit covered what appears to be an old stream channel deposit marked by lenses of gravel. No cultural material was recovered from the unit, however. There is also evidence, in the form of buried historic items, that the fill along the stream bank is relatively recent in origin. The modern items included a solidly cemented mass of round nails, pieces of wire and other unidentifiable metal fragments buried approximately 50 cm deep in the bank about 10 m east of the test unit. No cultural features, diagnostic artifacts, ceramics, faunal or floral remains or datable carbons were recovered at Locality II.

Artifact Assemblage from Locality II

Chipped stone tools and manufacturing debris made up the entire inventory from Locality II. The distribution of this material is shown in Table 17.

Bifaces (n=2)
The bifaces from Locality II were both recovered from the surface collection along the stream bank. Both were roughly worked blanks made of Winterset chert.

Edge-Modified Flakes (n=5)
The edge modified tools recovered from Locality II all came from the surface collection along the creek bank. All exhibit small working edges with attrition and step fracturing, and two have utilized projections on them.

Manufacturing Debris (n=23)
The manufacturing debris from Locality II was all in the form of lithic debitage of Winterset chert. No cores were recovered from Locality II.

Discussion

Both Localities I and II exhibit light deposits of lithic debitage and tools which appear to be redeposited. Locality I appears to be washing in from an upslope quarry. Artifacts present date to the Late Woodland or Mississippian period. The source for Locality II is unknown. The prehistoric cultural material appears to have been disturbed by stream action and mixed in with modern materials and thus is of little study value.

The historic material noted in the area of Locality II appears to be related to modern farming activities. There is an unused stock feeding pen located approximately 75 m to the west of the test unit. A modern farm is located on the bluff top above the site and the material from the site area is related to activities on this farm.

Recommendations

This site consists of two localities, both of which appear to contain redeposited material. Locality I appears to have been deposited as a result of slopewash from a quarrying area on a hillside, and Locality II from an unknown source upstream. Cultural material density at both is light, and it is unlikely that further work at the site would be particularly productive. Site 23JA163 is not considered significant and no further work is recommended.

23JA164

23JA164 is located below the end of a ridge on a small cultivated knoll and is bound on the north by a tributary of the Little Blue River (Fig. 55). It is in Blue Springs Corps Tracts 100 and 117 at an elevation of 780-839 ft (238-243 m). The southern portion of the site is uncultivated but has been disturbed by the construction of a water channel. It covers an area of approximately 5800 square meters. Brown recovered 19 pieces of debitage from a road on the south edge of the cultivated field (Brown 1977:16).

Description of Investigations

The site was first divided into 34 10 by 10 m grid units and surface collected with 15 minutes for each unit. This revealed a moderately dense surface scatter of lithic debris (Fig. 55) with three areas of higher density. Three hand excavated one by two m test units and two by two m unit were combined with four backhoe trenches to determine the soil stratigraphy and its relationship to the cultural deposits. These demonstrated a general correspondence between the surface density and the relative amount of subsurface material. One test unit on the slope to the south was sterile, but other test units and a series of 45 shovel cuts on the slope indicated that cultural material was present just to the south of the cultivated field and that occasional pieces of debitage existed just below the surface as far as the midpoint of the slope.

Figure 57 illustrates the stratigraphy exposed by the backhoe trenches. Unit I is a plastic, smooth textured yellow tan clay with numerous black manganese or iron concretions. On the knoll this unit was overlain by a loosely consolidated reddish clay containing numerous orange or brown concretions (Unit II). This unit pinches out on the sides of the knoll but is continuous down the center of the ridge. Unit II is exposed on the surface on the top of the knoll but lower down on the sides it is overlain by Unit III, a dark gray brown or black alluvia clay. On the slope to the south is a brown, friable colluvium with numerous fragments of limestone and chert.

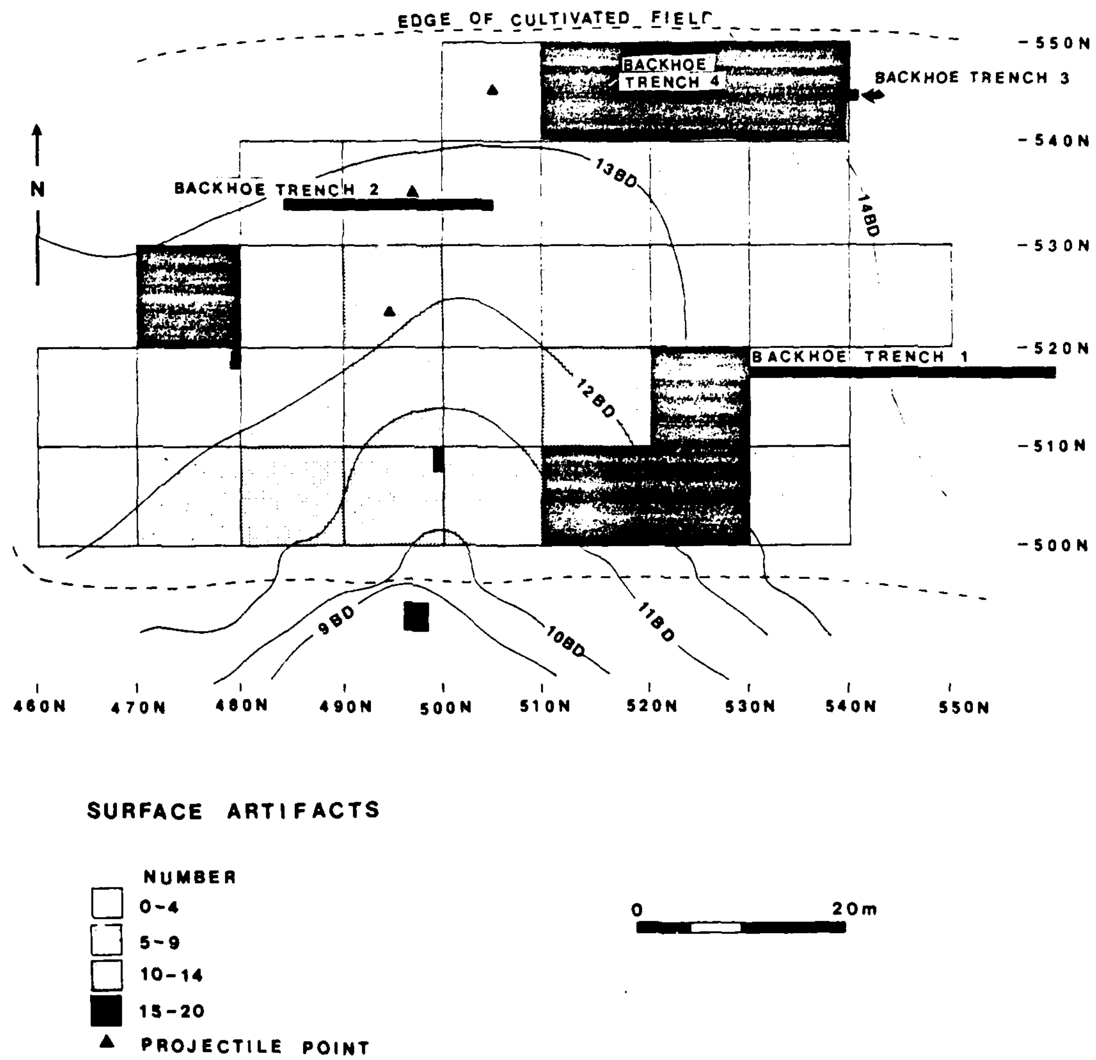


Figure 55. Location of test units and distribution of cultural material at 23JA164.

Figure 56. General view of 23JA164.

Units I and II appear to relate to an old T-1 terrace while Unit III is the more recent alluvium. The fill of Units I and II is similar to that of T-1 terrace fills in other parts of the Little Blue drainage. A high density of cultural material was recorded where this soil was exposed on the surface, and debitage was also noted where it was encouraged in the backhoe trenching. This material consisted entirely of chipped stone. No features, prehistoric ceramics, faunal or floral remains or datable carbon was recovered from the site.

Artifact Assemblage

Prehistoric cultural material recovered form the site includes five projectile points, two biface fragments and 25 edge-modified flakes. Subsurface artifact density was light and most of the cultural material came from the surface collections. A number of ceramic sherds was recovered from the site, but all were of recent origin and documented the site's usage as a skeet shooting range, as did the numerous shotgun shells which also littered the surface. Table 18 presents the distribution of the cultural material.

Chipped Stone Tools

Projectile Points (n=5)

Four projectile points were recovered from the gridded surface collection, and one was found in the backdirt of one of the backhoe trenches. The distal portion of a Nebo Hill point (Fig. 58a) was found on slope of the

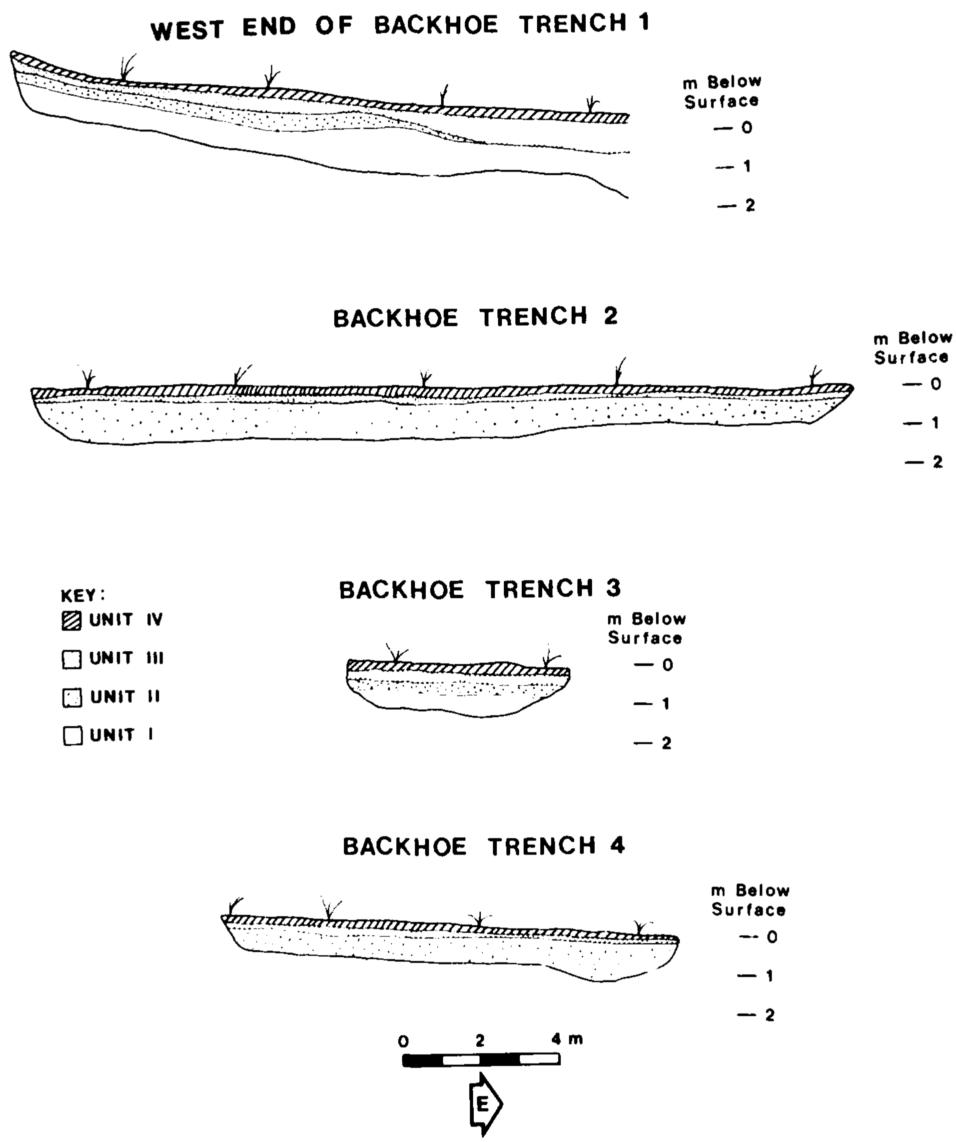


Figure 57. Stratigraphic profiles of the backhoe trenches at 23JA164.

Table 18. Artifact assemblage recovered from 23JA164.

	TEST UNITS	SHOVEL TESTS	BACKHOE TRENCHES	GRIDDED SURFACE UNITS	GENERAL SURFACE COLLECTION	TOTAL
CHIPPED STONE TOOLS						
Projectile Points				5		5
Bifaces			2			2
Edge-Modified Flakes	3	9	3	17		32
Total	3	9	5	22		39
MANUFACTURING DEBRIS						
Cores			2	1		3
Debitage	49		76	293		418
Total	49		78	294		421
HISTORIC MATERIALS	1			132	2	135
TOTAL	53	9	83	448	4	597

knoll, and a large corner-notched dart point (Fig. 58b), similar to the Late Archaic points from the Snyder (Grosser 1977) and Coffey (Schmits 1980) sites was recovered from the top of the knoll. Both of these points are on top of the exposed T-1 terrace fill. Lower down the slope, on the more recent alluvial fill, a small side-notched point of gray Winterset chert (Fig. 58c) was found along with the midsection of a small dart point of a reddish brown quartzite (Fig. 58d). The side-notched point is similar to some of the Late Woodland types reported by Martin (1976:40) from the Fishing River drainage, and the Reed side-notched point discussed by Chapman (1980:311) from the Mississippian period. The base of a triangular unnotched point or preform (Fig. 58e) came from the backdirt of Backhoe Trench 2 on the lower part of the site. It is relatively thick (7/mm) and is made of gray Winterset chert.

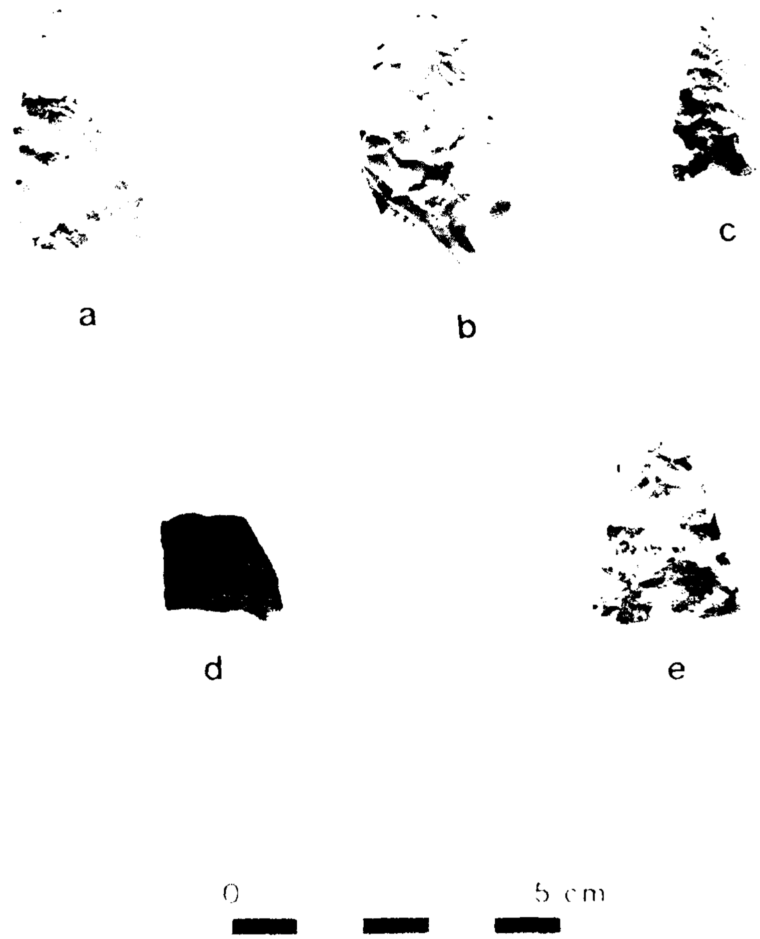


Figure 58. Projectile points from 23JA164.

<u>Bifaces</u> (n=2)

Two small biface fragments were recovered during the backhoe testing. One is a portion of a small lanceolate of a white exotic chert and the other is a small irregular edge fragment of reddened Winterset.

Edge-Modified Flakes (n=32)
The edge-modified flakes from the site included a number of cutting and scraping tools, many with multiple working edges. Six flakes exhibited one or more small retouched perforator or graver tips. All but one of these also had a scraping or cutting edge on it as well. One case of apparent usage of a fortuitous point on a flake as a perforator or graver was also noted.

Manufacturing Debris (n=421)
Three cores of Winterset chert were recovered from the site. One was an irregularly discoidal fragment. One was a small unifacial core and the third was of the pyramidal type. All of the debitage was of Winterset chert, and the relatively low (5 percent) number of primary and secondary flakes indicates that most of the primary reduction was accomplished elsewhere. Almost all of the flakes from the site appear to have come from prepared blanks and cores.

Other Lithic Artifacts

Hearthstone (n=2)
Two reddened limestone cobbles which appear to have been fired were recovered from one of the shovel cuts on the slope. No other evidence of a hearth was recovered.

Historic Material

Modern Debris (n=135)
The historic material from the site was all of quite recent origin and was largely made up of shotgun shells, the remains of numerous clay pigeons and a metal door hinge. There are larger items such as old stoves and auto parts just off the edge of the field.

Discussion

The site appears to have at least two components, a Late Archaic occupation of the T-1 terrace and a Late Woodland or Mississippian occupation which is found in the later alluvial flood plain sediments. The distribution of cultural material is complex due to slope wash and cultivation, but the distribution of projectile point types tends to support this analysis. The site is located immediately downslope from a large Late Archaic site (23JA35) and could represent a small ancillary processing or procurement area for resources available on the lower terraces or flood plain. A similar Late Archaic site (23JA154) is located at the south base of the same bluff approximately 600 m south of 23JA164 (Brown 1977:51). Site 23JA154 contained similar cultural materials in a physiographic position much like that at 23JA164. Late Woodland is also represented nearby in a small rockshelter site approximately 200 m southeast (23JA37) but the relationship of the two sites is not presently known with certainty. The lack of faunal and floral remains and the small and generalized inventory of tools as well as the degree of modern disturbance renders interpretation difficult. The site's potential for further productive work is very small.

Recommendations

Although there is subsurface material present at the site, the majority of artifacts are in the plow zone and on the surface. Artifact density is low and the diversity of tools exhibited on the site is limited. It is similar to a number of sites in the Little Blue Valley, and it is unlikely that further work on this site would provide substantial gains in the data base for the area. For these reasons 23JA164 is not considered signficant, and no further work is recommended at the site.

23JA165

The site is in Blue Springs Corps Tracts 162 and 118 (Fig. 59). It is located at an elevation of 910 ft (277 m) on a bluff top near the head of a small tributary about 1.2 km southeast of the Little Blue River. The 1976 survey recovered 23 pieces of debitage and one biface on the surface of the bluff top and also noted the presence of a large amount of unworked buff colored chert (Brown 1977:44).

Description of Investigations

The testing in 1979 was primarily oriented toward determining if buried cultural deposits existed on the site and if so their extent. Surface visibility was extremely low due to heavy vegetation cover, but a trail and several eroded areas were examined for surface material. In addition, four one by two m test units were excavated on the bluff top to test for subsurface deposits. No cultural material was recovered from the surface or from the test units. The upper soil on the bluff top is a gray brown, smooth textured silt loam (Unit II). This occurs to a depth of 16-20 cm and lies over a light brown, angular clay loam (Unit I). Both of these units contain occasional natural buff colored chert fragments. The slope of the ridge exhibits a much higher density of unworked chert both on the surface and in the soil. The upper soil (Unit II) of Test Unit I on the slope is a blocky brown clay approximately 30 cm deep. Below this is a yellowish clay with organic material and high density of chert fragments (Unit I). Large limestone cobbles occur at about 40 cm. No cultural material was noted in this unit. The east end of the bluff top is littered with unworked fragments of weathered, buff colored Winterset chert. Most of the debitage recovered in 1976 was blue gray Winterset and does not appear to have originated on the site.

Discussion

Based on the small amount of cultural material reported from the 1976 survey, 23JA165 is apparently a small limited activity area. The scarcity of cultural material makes further interpretation unreliable. It does not, however, appear to be related on the occurrence of the chert found as a regolith here. All of the flakes recovered were of gray Winterset chert. None of the local, buff colored was worked.

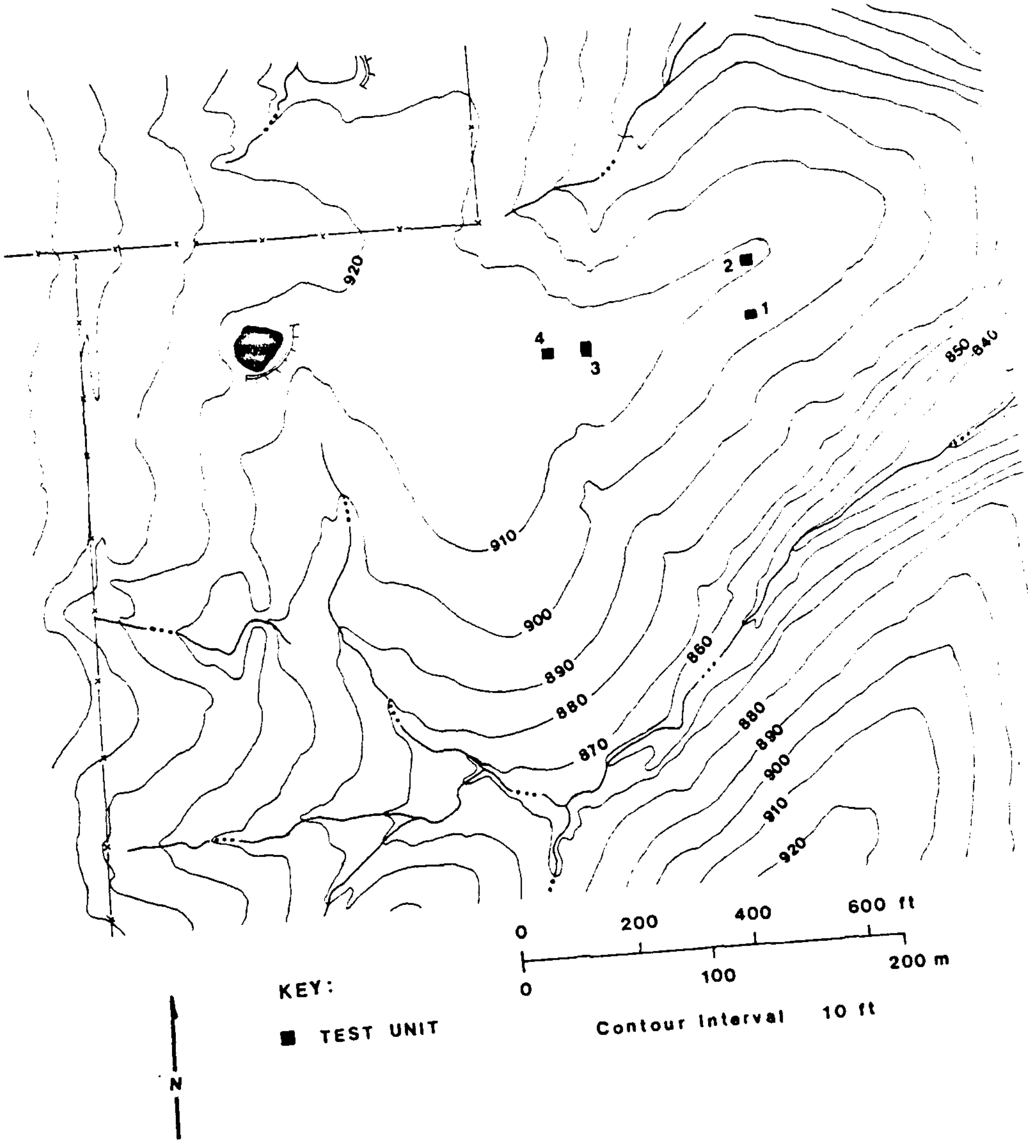


Figure 59. Location of 23JA165.

Recommendations

The site is represented by a very small amount of cultural material, and no subsurface cultural material was encountered. It is therefore unlikely that further investigations would prove productive. The site is not considered significant, and no further work is recommended at 23JA165.

23JA166

23JA166 is located on top of a high bluff at an elevation of 870 ft (265 m) almost 300 m south of the Little Blue River. It is in Blue Springs Corps Tract 138 bound on the north and east by limestone cliffs. Surface collection in 1976 resulted in the recovery of about 20 flakes from the bluff top (Brown (1977:54).

Description of Investigations

Intensive surface reconnaissance in 1979 did not locate any additional prehistoric cultural material. Subsurface testing was initiated to determine if undisturbed cultural deposits existed on the site. Three one by one m test units were placed on the site; Test Unit 1 was located on the crest of the bluff, Test Unit 1 was on the slope to the north, and Test Unit 3 was on a flat area near the bluff edge. Only Test Unit 1 contained any cultural material. The two lower units contained large quantities of unworked limestone and chert cobbles in a brown silt loam matrix. Test Unit 2 contained a single bovid calcaneous just under the surface. Its size and condition indicate that it is probably that of a cow.

The upper 20 cm of Test Unit 1, on the crest of the bluff (Fig. 61), contained moderate amounts of rock debris and a number of large limestone slabs in a brown silt loam matrix (Unit II). The amount of rock debris diminished below approximately 20 cm, and the soil was a light brown silt (Unit I).

Test Unit 1 also contained 63 historic items and four flakes of Winterset chert. Three of the flakes came from the upper 20 cm associated with the historic material, and one was recovered from the next level.

Artifact Assemblage

The cultural material recovered from 23JA166 was limited to four flakes of Winterset chert, two bone fragments of questionable antiquity, and a large amount of historical material (Table 19).

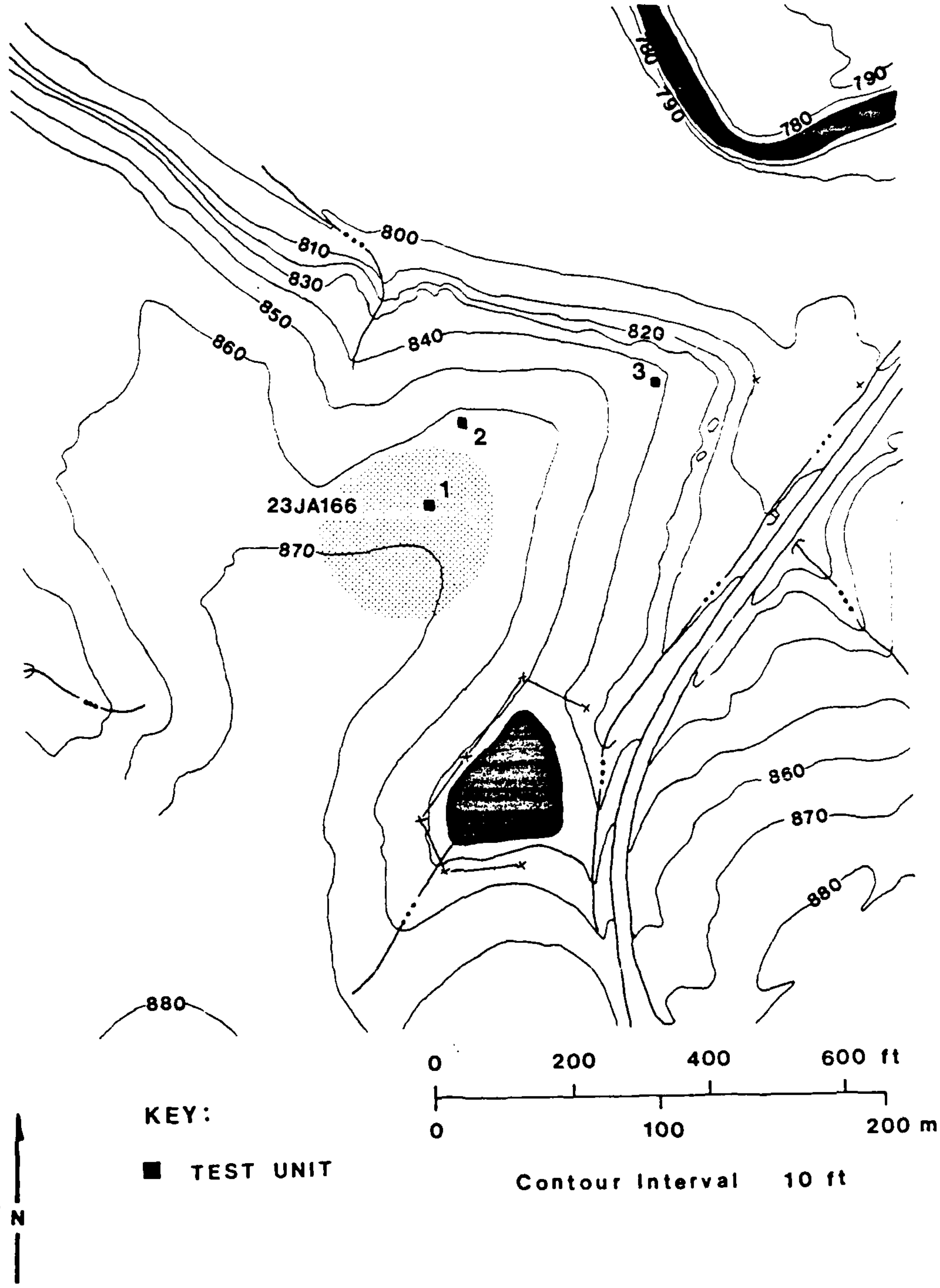


Figure 60. Location of 23JA166.

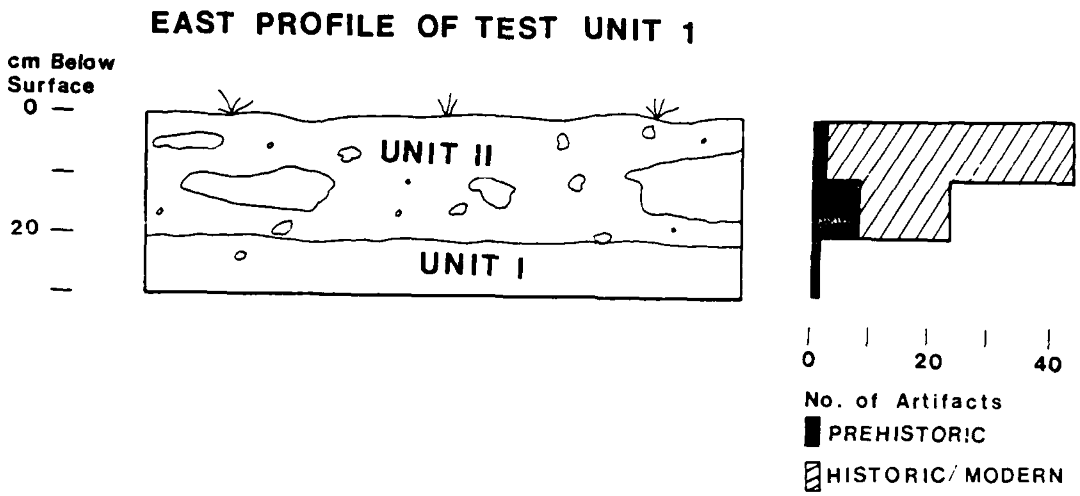


Figure 61. Profile and distribution of artifacts at 23JA166.

Table 19. Artifact assemblage recovered from 23JA166.

	TEST UNIT 1	TEST UNIT 2	TOTAL
MANUFACTURING DEBRIS			
Debitage	4		4
FAUNAL REMAINS	1	1	2
HISTORIC MATERIALS	63		63
TOTAL	68	1	69

Chipped Stone Tools

Manufacturing Debris (n=4)
The prehistoric cultural material from the site consisted of four flakes of Winterset chert. These were all recovered from the upper 30 cm below the surface in Test Unit 1 on the top of the ridge.

Faunal Material

Unworked Bone (n=2)
One bovid calcaneous was recovered from the upper 10 cm of Test Unit 2, but it condition and size indicate that it is most likely a recent cow. The other bone came from Test Unit 1 and was a small unidentifiable fragment which may be related to either the modern or the prehistoric material from the unit.

Historic Material

Modern Debris (n=63)
The historic material from the site consisted of nails, glass fragments, crockery and 38 calibre cartridges. It was all recovered from the upper 20 cm of Test Unit 1.

Two landowners, George Hopkins and G. Cole, were reported to have built structures in the quarter section containing the site prior to 1877 (Brown 1977:182), and the historic material may relate to activities on these farms. The majority of the material appears to be twentieth century debris. The amount of material indicates that some intensive use was made of this area in the historic and recent period and it is probable that a structure was present in the vicinity.

Discussion

Site 23JA166 probably represents a small, limited activity area, but it is not possible to assign a cultural affiliation or determine the types of activities performed on the site due to the minimal nature of the deposit. The deposits are heavily disturbed by modern activities and present little opportunity for further productive archaeological investigations.

Recommendations

This site was represented by a very shallow deposit of cultural material on the crest of a ridge. The deposit is very light and is thoroughly mixed with historic materials. No diagnostics have been recovered from the site, and cultural affiliations are unknown. It is not likely that significant data would be recovered from continued work at the site. For these reasons, the site is not considered to be significant, and no further work is recommended.

23JA168

Site 23JA168 is in Longview Corps Tract 143 at an elevation of 30 ft (283 m). The site is located in a cultivated field on a south facing slope about 1.75 km west of the Little Blue River (Fig. 62). The 1976 surface collection consisted of one uniface, three flakes, and a small triangular unnotched projectile point (Fig. 63A). On the basis of this point, the site was classified as Late Woodland, Mississippian or later (Brown 1977: 87).

Description of Investigations

Surface visibility was good in 1979, and the crew performed an intensive reconnaissance. No additional cultural material was recovered. Two one by one test units were excavated in the area indicated in the 1977 report, but no prehistoric material was encountered.

The soil in Test Unit 1 was a smooth textured black clay (Unit III), heavy in organics, over a grayish brown clay (Unit I). The transition was gradational but appeared to occur at approximately 35 cm below the surface. The same upper, black clay (Unit III) was present in Test Unit 2, but it was only approximately 20 cm deep and was over an orange mottled black clay deposit referred to as Unit II.

Discussion

The artifacts reported by Brown (1977:87) could represent a small food processing area, possibly related to hunting, but the extremely small cultural inventory from the site indicates a very short term utilization. The lack of any cultural material on the site made it impossible to determine site size, but it was likely quite small, 1000 square meters or less. More detailed interpretation would not be jusified in view of the limited data available. The potential of the site for further productive archaeological work is negligible.

Recommendations

Cultural material at 23JA168 was extremely scarce, consisting of a total of five items. No cultural material was recovered on the surface or below it in the testing. There is negligible potential for further productive archaeological investigations, and the site is not considered to be significant. No further work is recommended at 23JA168.

23JA169

Site 23JA169 is located in Longview Corps Tract 125 at an elevation of 810-870 ft (247-271 m).

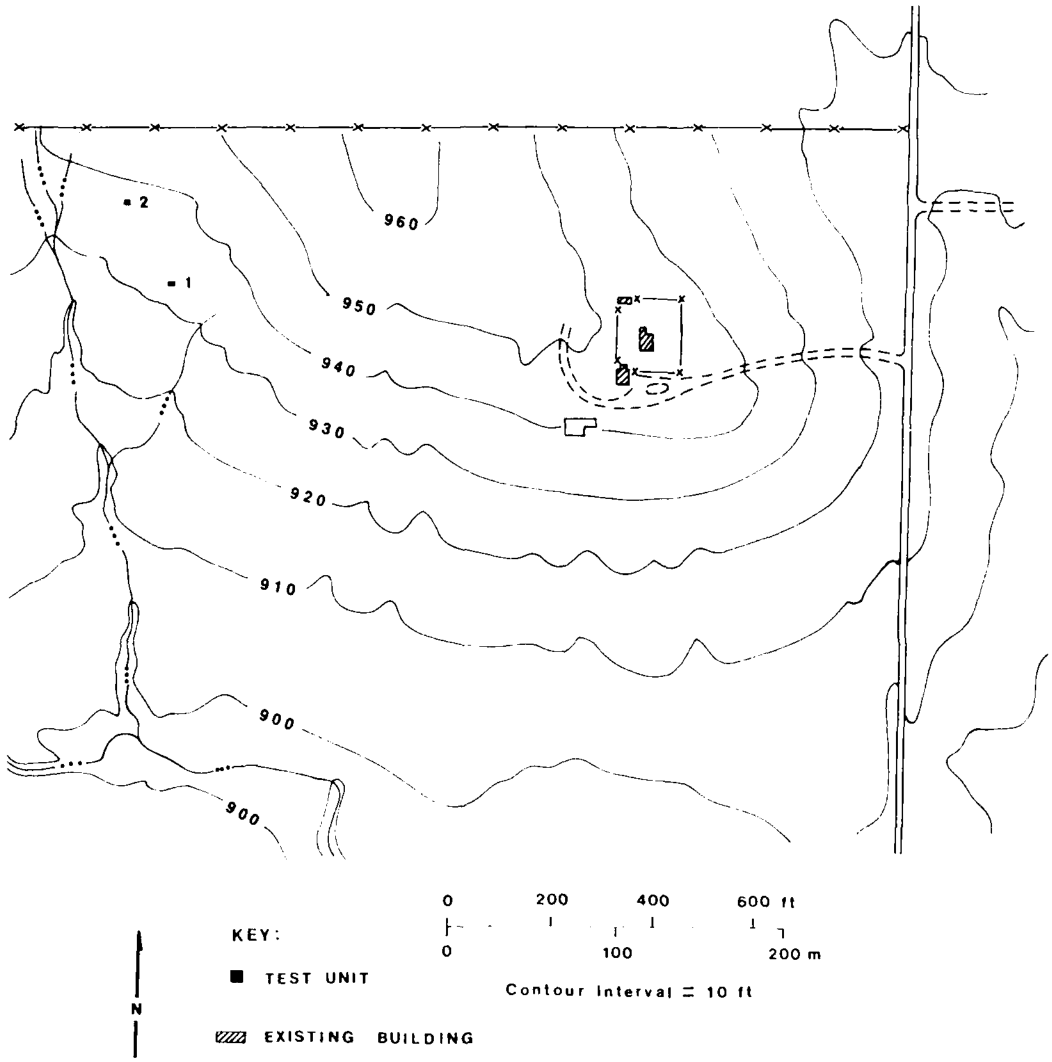


Figure 62. Location of test units at 23JA168.

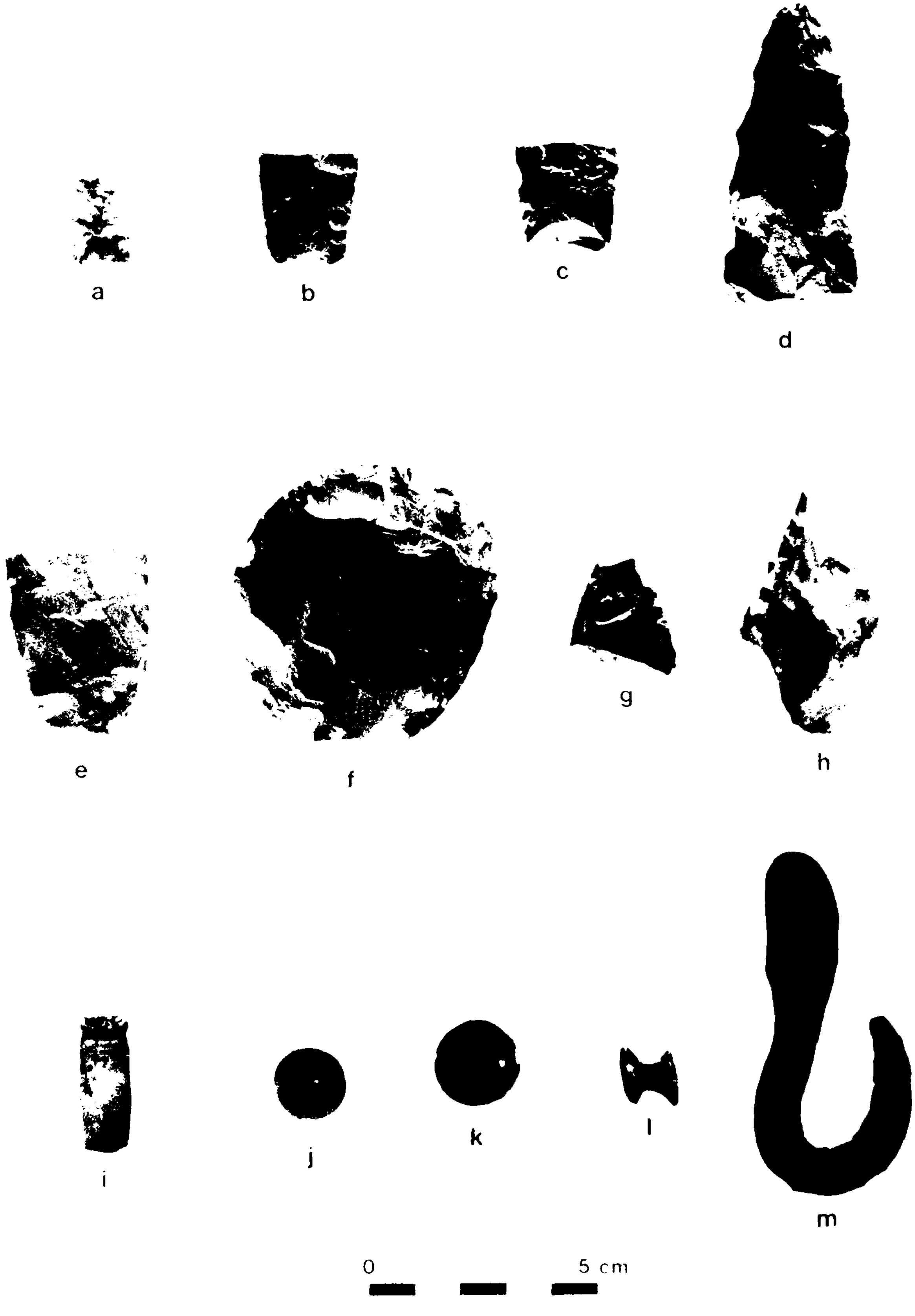


Figure 63. Artifacts from 23JA168, 23JA169, 23JA172 and 23JA173: (a) projectile point from 23JA168, (b-c) projectile points from 23JA169, (d-g) bifaces from 23JA169, (h) projectile point from 23JA172, (i-m) historic artifacts from 23JA173.

It is a large site on the west side of the Little Blue River, covering the top of a bluff and the T-1 terrace below it. Brown (1977:90) dug several test units on the terrace and on the bluff top but did not record what was recovered from them. In addition, four test units were excavated on the T-1 terrace and the bluff slope by Wright (1979:49-56) during the testing of 23JA112 for the Little Blue Valley Sewer District (Fig. 64). These test units are reported as being located on the latter site but are in fact clearly on the area delineated by Brown as 23JA169. The legal location and description as reported by Wright (1979:49) matches that of 23JA169 and not 23JA112.

Description of Investigations

The bluff top and the terrace were in pasture in 1979 and did not appear to have been cultivated for several years. The bluff slopes were heavily wooded as were several areas along with bank of the river. Vegetation in all areas was heavy, and surface visibility was very low. The site was divided into three localities based on topographic relationships. Locality I covers approximately 15,000 square meters on the top and slope of a high, east-west trending bluff. Locality II is on a bluff top immediately south of Locality I and separated from it by a deep draw. It covers approximately 4100 square meters. Locality III is on the T-1 terrace on the west bank of the Little Blue River and covers approximately 5100 square meters.

Three one by two test units were excavated in Locality I, one in Locality II, and three in Locality III. A light to moderate deposit of cultural material was recovered from all three localities, but no diagnostic artifacts, features of floral remains, or datable carbons were recovered from the testing.

Locality I covered a large area of pasture on the top of the bluff. Flakes were noted in the backdirt of a recent pipeline recovery trench and in a roadbed which ran through the site. Test units were placed on the top of the bluff near the pipeline trench (Test Unit 1), out towards the end of the ridge on a flat area (Test Unit 2), and on the slope near the base of the ridge (Test Unit 3). Moderate amounts of cultural material were recovered from Units 1 and 2, and some redeposited cultural material was recovered from Test Unit 3.

The upper 30-35 cm in Test Units 1 and 2 was a dark brown smooth textured silt (Unit II) loam, with an indistinct plow zone (Unit III) discernable at approximately 20 cm below the surface. The lower soil unit (Unit I) was a dark yellowish brown silty clay with a small angular ped structure (Fig. 65). Cultural material was recovered to a depth of 50 cm in Unit 1 and 30 cm in Test Unit 2, but the greatest percentage of the material in both units was in the upper 20 cm. The upper 15 cm of Test Unit 3 was a dark brown silt loam similar to the upper zone in Test Units 1 and 2. The soil below this (Unit II) was a dark brown silty clay with moderately well sorted subangular gravels, mostly limestone and chert. Below this at about 30 cm below the surface was a zone of similar soil but without the gravels (Unit I). At the bottom of this layer were large pieces of decomposing limestone with bedrock showing up at about 40 cm below the surface. This test unit produced a few pieces of debitage and edge-modified flakes in the upper 30 cm. The material appears to be redeposited from upslope.

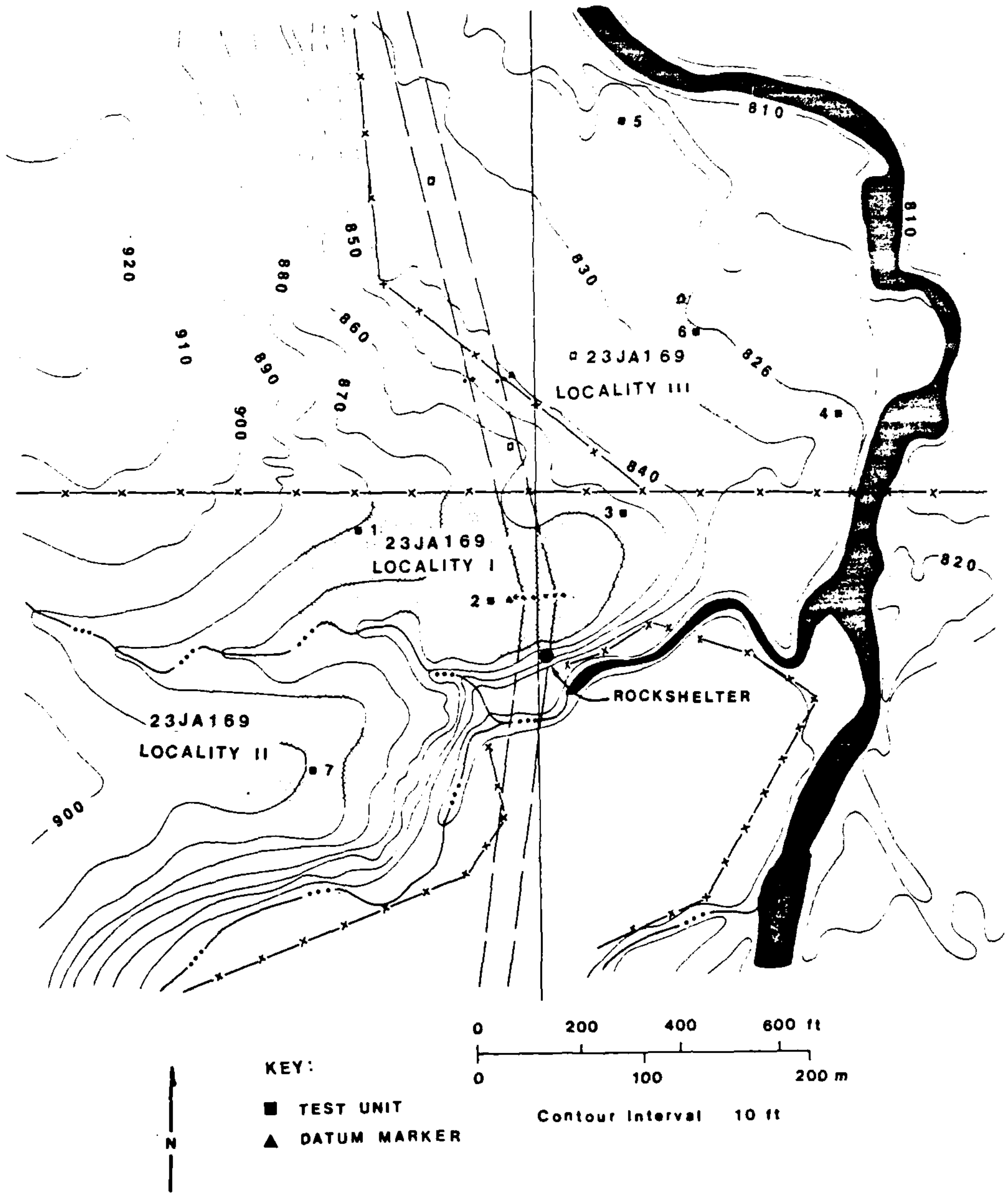
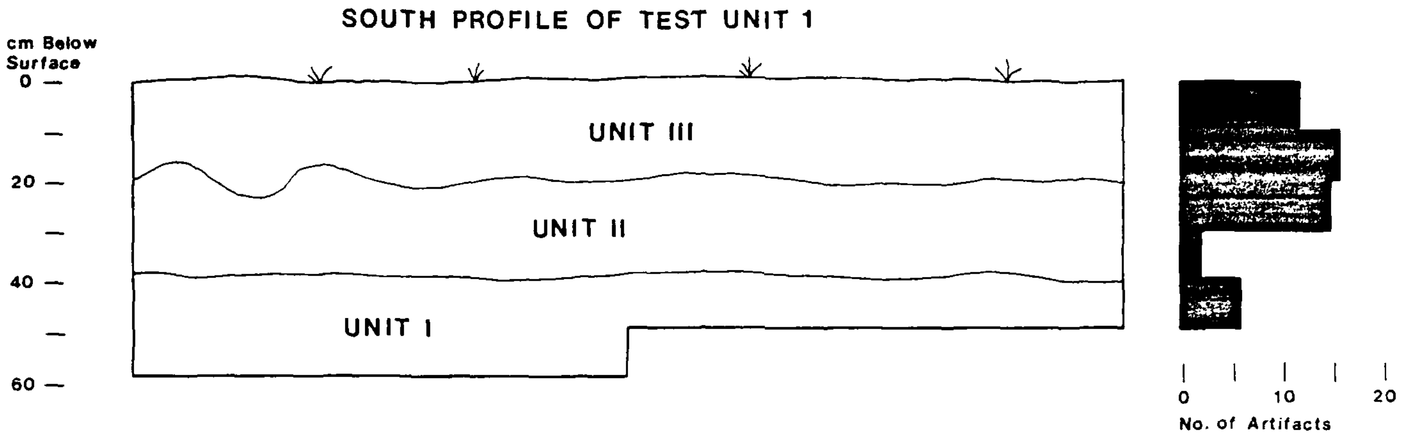


Figure 64. Location of Localities I, II and III at 23JA169.



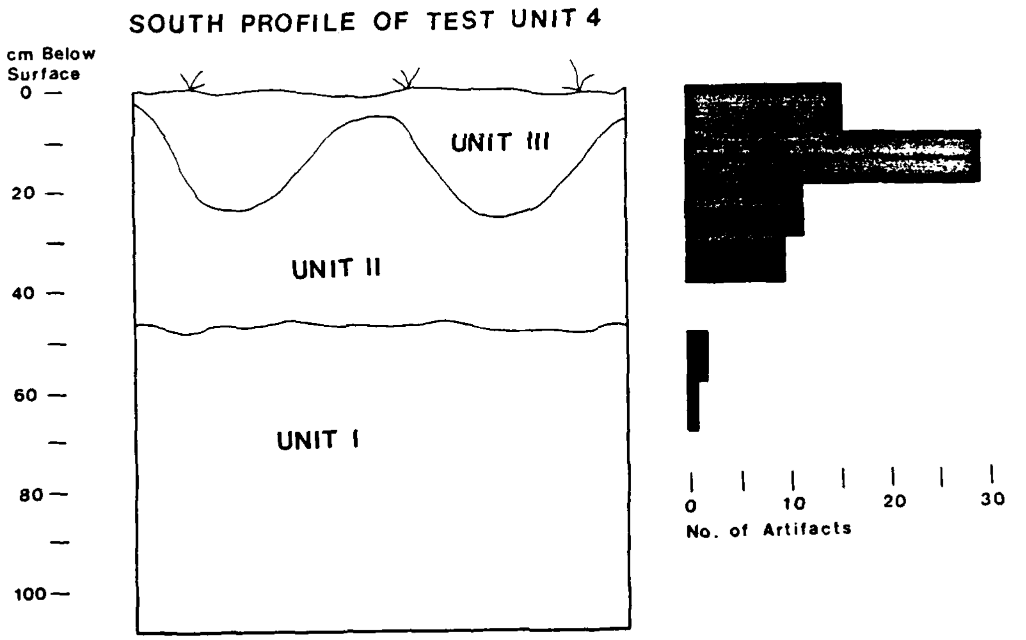


Figure 65. Profiles and distribution of artifacts at 23JA169.

Also present at Locality I is a small rockshelter in an outcrop of limestone on the south slope of the bluff. Some debitage was recovered just above the shelter, and one flake was found in the shelter itself. There is also evidence of fire inside the overhang. The shelter is too small to stand up in and overhangs only about 2 m. The floor has been nearly completely eroded out and slopes away steeply from the back of the shelter.

Locality II, to the south of Locality I, had a few flakes exposed in the pipeline recovery trench. A test unit near the trench (Test Unit 7) recovered debitage and tools only in the upper 10 cm. Below this was a hard red clay which contained no cultural material.

Locality III is on a T-1 terrace remnant approximately 3 m above the T-0 terrace. The prehistoric occupation seems to be concentrated along the terrace edge. Soil profiles from the three 1979 test units and the three units excavated by Wright (1979) in the same area are all similar (Fig. 65). The plow zone (Unit III) is dark grayish brown and is approximately 20 cm thick. Beneath this is a dark brown silt loam (Unit II) which extends to 35 cm below the surface, becoming much thicker towards the terrace edge. Below this is a dark brown clayey silt loam (Unit I) extending to a depth of at least 1.5 m (Wright 1979:51).

Unit 5, on the northern end of the terrace, produced no cultural material. Unit 6, approximately 150 m southeast of Test Unit 5 on the terrace edge, contained a light deposit of cultural material down to 60 cm below the surface. This material included lithic debitage, one biface fragment, and eight ceramic sherds which came from the 20-30 cm level. Wright's Test Unit 2, a few meters to the north, produced only one flake from a two by two m excavation (Wright 1979:55). The highest density of cultural material came from SSI's Test Unit 4, located on a small projecting finger at the southern end of the terrace. A total of 71 cultural items including two bifaces, eight edge-modified flakes and 61 flakes was recovered from this unit. The material was recovered to a depth of 60 cm, but 65 percent of the total came from the upper 20 cm. No ceramics were recovered from this unit. No features, faunal or floral remains, or datable charcoal was recovered from the site.

Artifact Assemblage

Artifacts from 23JA169 included a small sample of ceramics, fragmentary projectile points, bifaces and edge-modified flakes as well as lithic manufacturing debris. Their distribution is presented in Table 20.

Ceramics

<u>Body Sherds</u> (n=8)

There were eight small, badly weathered body sherds recovered from the 20-30 cm level in Test Unit 6. They all are tempered with coarse sand and appear to be from the same vessel. None are larger than 16 mm, however, and it is not possible to describe the surface treatment or even to reliably estimate thickness. It is not possible to assign a cultural affiliation other than Woodland or later based on these sherds.

Table 20. Artifact assemblage recovered from 23JA169.

	TEST UNITS			SURFACE		
	LOCALITY I	LOCALITY II	LOCALITY III	LOCALITY I	LOCALITY II	TOTAL
CERAMICS			8			8
CHIPPED STONE TOOLS						
Projectile points				2		2
Bifaces	4	1	3	3	1	12
Unifaces						
Edge-modified flakes	20	6	12	21	1	60
Total	24	7	15	26	2	74
MANUFACTURING DEBRIS						
Cores	4		1	4	1	10
Debitage	159	47	72	22	10	310
Total	163	47	73	26	11	320
HISTORIC MATERIAL	2	3	6			11
TOTAL	189	57	102	52	13	413

Chipped Stone Tools

Projectile Points (n=2)

One diagnostic projectile point (Fig. 63b) was recovered from the surface of the T-1 terrace at the base of the bluff in the area which had been disturbed by tree clearing operations subsequent to the 1979 testing of the site. It is the base of a lanceolate Nebo Hill point with tapering basal edges and an incurvate basal margin. It is made of a pink and white exotic chert. The midsection of a thin serrated point with impact fracturing at both ends (Fig. 63c) was found on the surface of Locality I. One of the broken ends of the point exhibits step fracturing and attrition wear apparently from use as a scraper. It is possible that the point was broken in manufacture and that the serrations are platform preparations for further thinning flakes. The point is made of a grayish purple exotic chert.

Bifaces (n=12)

Eight bifaces were recovered from the testing, and four others were found on the surface or from the pipeline trench. These include two lanceolate blanks (Fig. 63d-e), an ovate knife with a finely normalized cutting edge (Fig. 63f), two thick ovate blanks which may be exhausted cores, and fragments of six other roughly worked biface blanks or fragments. Over half of them were of tan Winterset chert.

Edge-Modified Flakes (n=60)

Edge-modified flakes made up the largest category of tools with 38 examples from the testing and 22 from the surface collection. These included several varieties of small cutting or scraping tools, perforators or gravers, and notches. The material from the test units on the terrace showed an approximately equal distribution between gray Winterset and tan Winterset cherts. Those from the bluff top had only 32% gray Winterset chert. The rest were tan Winterset, both reddened and non-reddened.

Manufacturing Debris (n=320)

Of the ten cores recovered from the site, five were of gray Winterset chert. One was a small exhausted core of red, heat-treated Argentine chert. The others were of non-heated Winterset chert.

The percentages of gray Winterset and tan Winterset debitage differed markedly between the T-1 terrace and the bluff top. The T-1 terrace test units had 63% gray Winterset and 3% tan Winterset chert. Those on the bluff top had the reverse, with 39% gray and 61% tan. This tends to support the hypothesis that these were two distinct, chronologically separate occupations and indicates that the earlier Nebo Hill occupants made more use of the tan Winterset chert which outcrops nearby.

Historic Material

Modern Debris (n=11)

Historic material from the site consisted of fragments of clay pigeons, fence wire, and a fence staple. All were from the upper 10 cm of the test units. They are consistent with what would be expected from an area which has been farmed for many years.

Discussion

The site appears to contain at least two chronologically and spatially separate components, a Late Archaic occupation on the bluff top and a Woodland occupation of the T-1 terrace below. These assignments are based on minimal data and can only be regarded as tentative. Artifact inventories from these areas indicate relatively intensive occupation of at least small areas of Localities I and III. The artifact types are indicative of food preparation activities and lithic tool production. The lack of faunal or floral materials from the sample makes more detailed analysis of subsistence strategies unreliable, and the poor preservation of the ceramics and absence of datable carbon also render exact chronological placement of the components difficult.

Recommendations

There were not sufficient diagnostic materials to provide detailed cultural affiliations, and the chronological placement of the site is only tentative. The bluff top occupation exhibits areas of moderate lithic density, but only one diagnostic artifact was recovered. There are better preserved Woodland and Archaic components in other sites in the Little Blue drainage, and it is unlikely that 23JA169 would provide adequate data to justify further investigations. The site is therefore not considered significant, and no further work is recommended.

23JA171

Site 23JA171 (Fig. 66) is located in Longview Corps Tract 124 at an elevation of 905 ft (276 m). The site is in a cultivated field on top of the bluff about 500 m west of the Little Blue River and covers an area of approximately 30,000 square meters. A very light scatter of lithic debitage was recorded from the site surface in 1976 (Brown 1977:91).

Description of Investigations

The site was grass covered in 1979, and surface reconnaissance of a road and two large bulldozer cuts placed by the Corps of Engineers for soil tests recovered 19 pieces of debitages and two edge-modified flakes. Four one by two test units were excavated in the site to test for possible buried cultural deposits. A total of four pieces of debitage was recovered from these units.

The plow zone (Unit III) was approximately 25 cm deep in all units and showed up as a dark brown, friable, organic rich silt loam (Fig. 67). Below this was a smooth textured silty clay (Unit II) which extended to 30 or 40 cm below the surface with an indistinct transition to an orange mottled gray clay (Unit I). This extended to at least 60 cm. The cultural material was all in the upper 20 cm of the deposit.

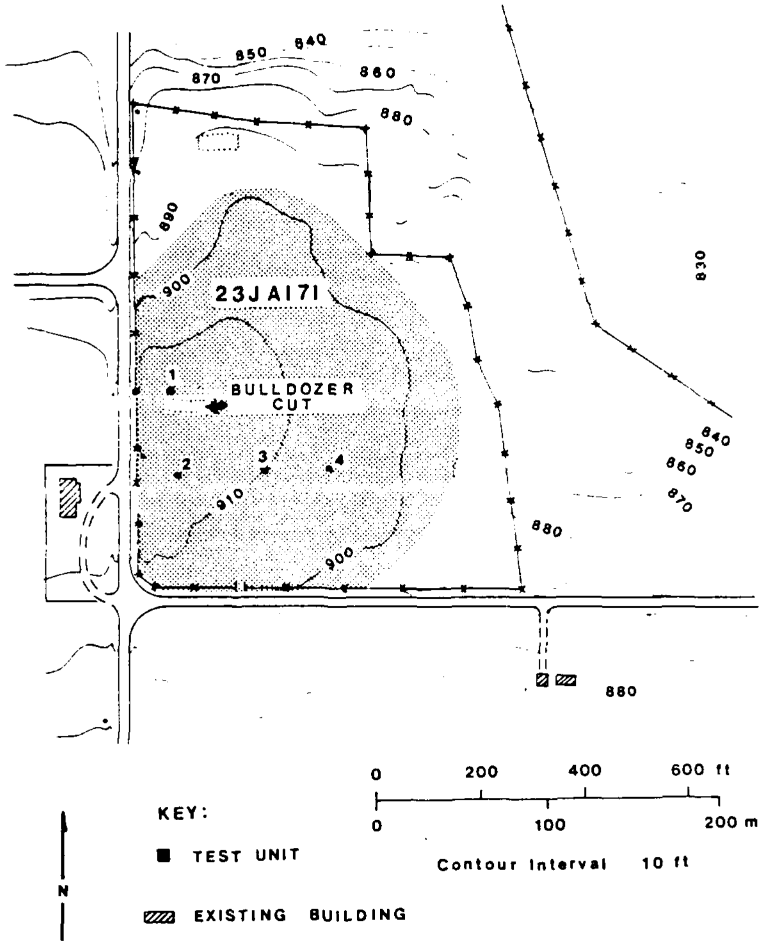


Figure 66. Location of 23JA171.

No diagnostic artifacts, features, ceramics, faunal or floral remains, or datable carbon have been recovered from the site. In addition, a local resident who has plowed the field a number of times does not recall any artifacts ever being recovered on the site in the past.

Artifact Assemblage

The cultural material from 23JA171 consisted entirely of chipped stone in the form of edge-modified flakes and lithic debitage (Table 21).

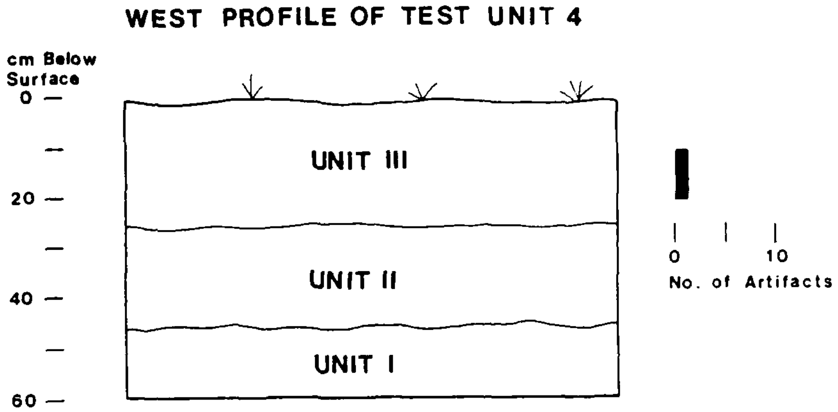


Figure 67. Profile and artifact distribution at 23JA171.

Edge-Modified Flakes (n=2)

The entire tool assemblage from the site consisted of two edge-modified flakes of Winterset chert. Both have attritional edge wear and straight utilized edges.

Table 21. Artifact assemblage recovered from 23JA171.

	TEST UNITS 1	2	3	4	SURFACE	CORPS SOIL TEST	TOTAL
CHIPPED STONE TOOLS							
Edge-modified Flakes					1	1	2
MANUFACTURING DEBRIS							
Debitage	3			1	16	3	23
TOTAL	3			1	17	4	25

Manufacturing Debris (n=23)
Subsurface cultural material consisted of four flakes. Twenty-one were recovered from the surface and the backdirt of the south Corps soil test trench. Fourteen (61%) were of gray Winterset chert. One exotic flake and 11 tan Winterset flakes were recovered.

Discussion

The site appears to represent a limited occupation of a bluff top, but the artifact inventory is not sufficient to determine the types of activities occurring on the site. The limited nature of the cultural deposits and disturbance by plowing indicate that the site's potential for answering questions pertinent to the area is quite low.

Recommendations

Due to the extremely low density of cultural material and the lack of diagnostic material, the site is not considered significant, and no further work is recommended.

23JA172

Site 23JA172 is located in Section 9, T47N, R32W in Longview Corps Tract 300 at an elevation of 870 ft (265 m) on a south facing slope of a bluff overlooking Mouse Creek, a tributary of the Little Blue River. A surface collection in 1976 recovered a small sample of lithics and a larger corner-notched point. Distribution of the lithics indicated that they were eroding out of the slope in the southern half of the field. Based on the projectile point, Brown (1977:93-94) assigned a Middle Woodland affiliation to the site.

Description of Investigations

Reconnaisance in 1979 revealed a small five by five m concentration of cores, chunks, flakes, and tools on the slope (Fig. 68). Thirty-nine kilos of Winterset chert were recovered from this area, several of the chunks weighing as much as 3 kilos or more. Most of the chunks have cortex on one or more surfaces. There was a light scatter of material over the rest of the slope, but 99% of the material recovered from the site came from the concentration.

Four one by two m units were excavated on the slope and on the crest of the knoll. Fig. 69 shows a dark brown clay loam approximately 50 cm deep (Unit II) over a gravel and rock layer (Unit I). Cultural material was recovered from only two test units and was limited to the upper 20 cm. These two units were Test Unit I, located on the eastern edge of the concentration, and Test Unit 2, 55 m north and up the slope from it. The lithic concentration was mapped and completely collected. No other features, faunal or floral material, or datable carbon were recovered from the site. Figure 70 provides a general view of 23JA172.

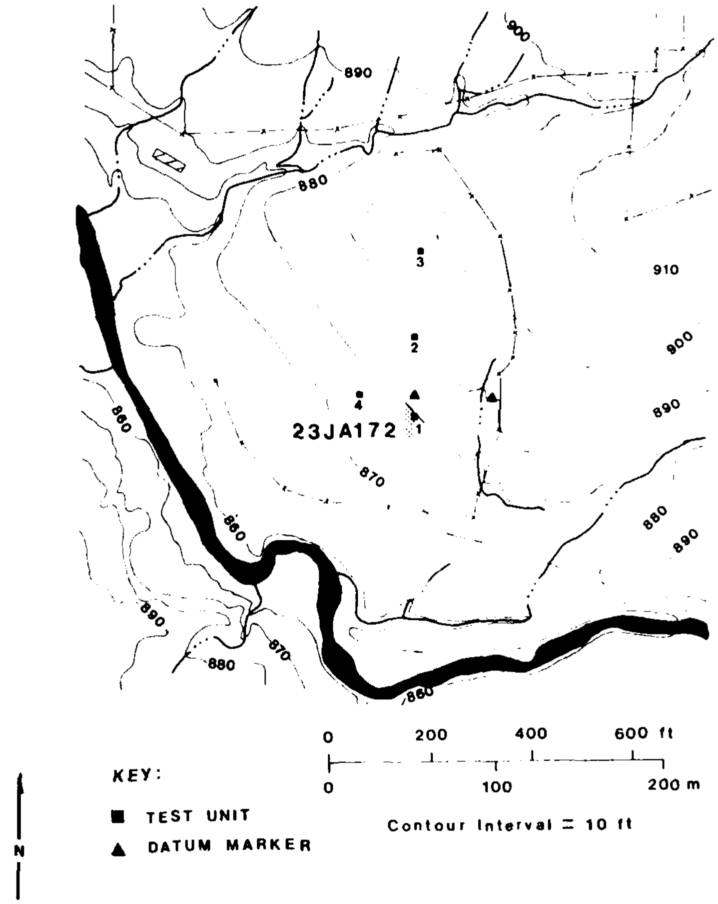


Figure 68. Location of surface scatter and test units at 23JA172.

Artifact Assemblage

The artifact assemblage from 23JA172 consisted of one projectile point, edge-modified flakes, and a large sample of Winterset chert chunks and cores (Table 22).

<u>Projectile Points</u> (n=1)

In 1979 a single, alternately beveled, contracting-stemmed projectile point (Fig. 63h) was recovered from the surface of the slope. The point is made of a pinkish, heated white non-local chert and is typologically similar to Langtry points reported from the Late Archaic to Middle Woodland contexts in the Midwest (Chapman 1980).

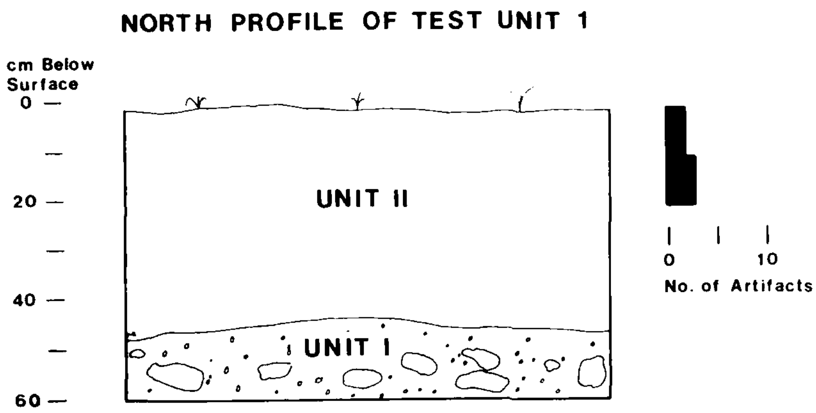


Figure 69. Profile and distribution of artifacts at 23JA172.

Edge-Modified Flakes (n=15)

Edge-modified flakes make up the rest of the tool inventory. A total of 15 such tools were recovered from the surface and the testing. All of these exhibit step fracturing indicative of use as a scraping tool.

Figure 70. General view of test excavation at 23JA172. Flags show location of chert cores and chunks.

Table 22. Artifact assemblage recovered from 23JA172.

	TEST 1	UNIT 2	SURFACE	TOTAL
CHIPPED STONE TOOLS				
Projectile Points			1	1
Edge-Modified Flakes	2	2	11	15
Total	2	2	12	16
MANUFACTURING DEBRIS				
Cores			4	4
Debitage	3	1	156	160
Total	3	1	160	164
TOTAL	5	3	172	180

Manufacturing Debris (n=164)

Four irregular cores, showing one or more flake removal scars, were recovered from the surface of the lithic concentration. The flake scars are random and do not indicate intensive utilization of the cores. All are of blue gray Winterset chert.

Thirty-nine flakes of blue gray Winterset were recovered from the site. Even though they appear to result from primary lithic reduction, few have any cortex on them. This is due to the tabular nature of Winterset chert: flakes are struck from the center of the core where there is no cortex.

The remainder of the manufacturing debris is made up of 121 small to large tabular chunks of blue gray Winterset chert. Several of these chunks weigh as much as 3 kg. This material made up 76 percent of the manufacturing debris. The majority of the chunks had cortex on one or more surfaces.

There are outcrops of gray Winterset chert located within a short distance of the site both as regolith deposits and bedrock deposits. A recently uncovered area a few hundred meters west has produced a quantity of raw material, but this was not apparently exposed aboriginally.

Discussion

The site is apparently a small primary lithic reduction workshop. The raw material was brought from nearby Winterset outcrops or regolith deposits

and apparently broken into useful or portable pieces. No biface blanks and only 39 flakes were recovered. It does not appear that any secondary shaping of tool blanks or preforms was performed at the site. Most of the large chunks do not show any cultural modification in the form of flake scars, and the few which have such scars exhibit no regular pattern in their removal.

Based on the projectile point typology, the site may be as early as the Late Archaic time period. It is, however, possible that the projectile point is not associated with the Winterset chert concentration. The latter is a small locus of activity, and the point was not found in direct association. The lithic concentration is likely the result of a single episode of lithic procurement which may not coincide with the loss or breakage of the point.

The 15 edge-modified flakes all have wear indicative of scraping utilization. These may indicate that wood or bone tool manufacture took place at this site.

Recommendations

This site represents a short term lithic procurement and primary reduction area and is restricted primarily to a small area on the slope. The cultural material is confined to the first few centimeters of the soil, and testing in areas away from the concentration recovered little cultural material. The site has been completely collected, further work would not produce additional significant information, and no further work is recommended.

23JA173

23JA173 is located in Longview Corps Tract 300 in a cultivated field on top of a bluff above a small tributary stream (Fig. 71). The site is at an elevation of 900 ft (274 m). It is approximately 300 m southeast of the Little Blue River at its closest point. A light lithic scatter was recorded in 1976 (Brown 1977:92) and a similar scatter was recovered in 1979. Based on the surface distribution of lithics it appears to cover an area of about 20,400 square m. The site was planted in wheat which had been recently cut, and surface visibility varied from about 20 percent to 50 percent at the time of testing.

Description of Investigations

Four units were excavated at the site in 1979 to test for buried cultural deposits. Only one of these units produced prehistoric cultural material and it was mixed with modern materials. Both prehistoric and historic items were recovered to a depth of 40 cm in Test Unit 4 at the southwest end of the site. No cultural material was recovered from the other three units. The plow zone (Unit II) in Unit 4 (Fig. 72) was a dark yellowish brown silty clay over a reddish brown silty clay zone (Unit I). Very little prehistoric or historical cultural material was recovered in this lower soil. The prehistoric cultural material consisted of four pieces of debitage and one edge-modified flake.

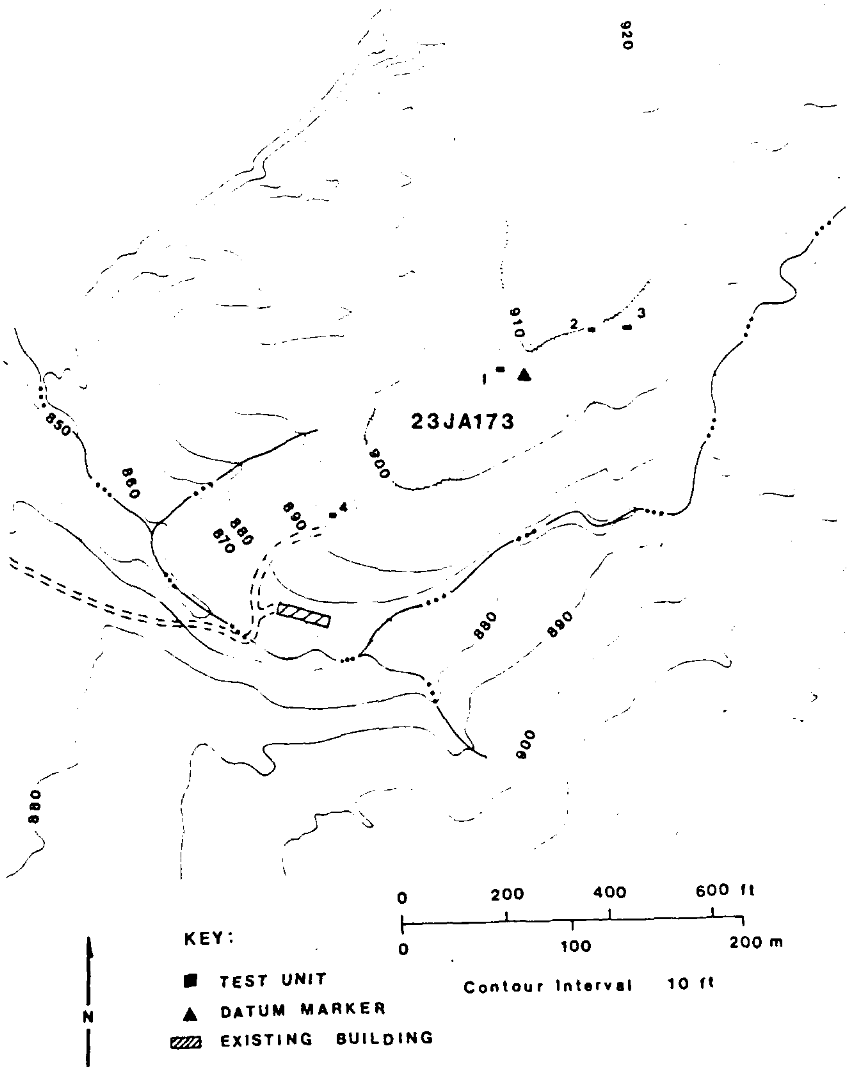


Figure 71. Location of 23JA173.

Historic items included square nails, a mother of pearl button, and a glazed ceramic marble. No diagnostic artifacts, ceramic features, faunal or floral remains, or datable charcoal were recovered from the site.

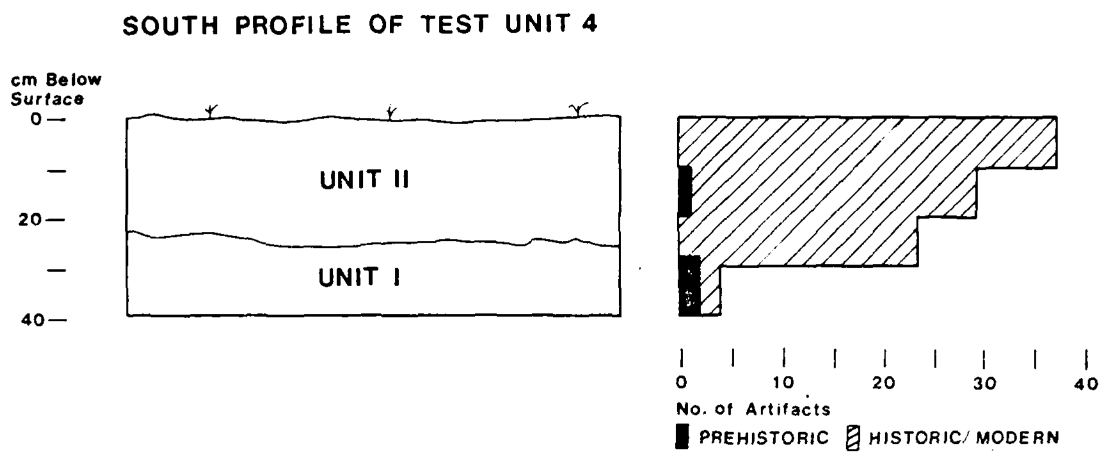


Figure 72. Profile and distribution of artifacts at 23JA173.

Artifact Assemblage

The artifacts from 23JA173 came primarily from the surface collection and consisted of chipped stone and historic material (Table 23).

Chipped Stone Tools

Bifaces (n=1)
The surface collection from 23JA173 included one roughly worked ovate biface of Winterset chert.

Edge-Modified Flakes (n=3)
One flake with a utilized projection was recovered from the 10-20 cm level of Test Unit 4. Two other flake tools were recovered from the surface. Both have small, straight working edges.

Manufacturing Debris (n=19)
Two cores of Winterset chert were recovered from the surface. Both were simply irregular fragments of raw material with a few flake scars on them. The surface collection produced 15 pieces of debitage, two were recovered from Test Unit 4 near the south edge of the field. All the debitage was of Winterset chert. Five of the flakes had cortex present.

Historic Material

Historic Debris (n=91)

The largest sample of artifacts consisted of historic material (Fig. 63i-m). Included are square nails, window and bottle glass fragments, a piece of a wine glass, crockery, and a glazed marble. There were also lathing nails, tin can fragments, a brass rivet, and a mother of pearl button. Another interesting find was what appears to be a piece of the leg of a porcelain doll. All of this material was recovered from Test Unit 4 at the south edge of the field. The material appears to date from the latter half of the nineteenth century or the early part of the twentieth.

Table 23. Artifact assemblage recovered from 23JA173.

	TEST UNIT 4	SURFACE	TOTAL
CHIPPED STONE TOOLS			
Bifaces		1	1
Edge-Modified Flakes	1	2	3
Total	1	3	4
MANUFACTURING DEBRIS			
Cores		2	2
Debitage	2	15	17
Total	2	17	19
HISTORIC MATERIALS	91		91
TOTAL	94	20	114

Discussion

It is not possible to assign a cultural affiliation to 23JA173 based on the data available, but it appears that the prehistoric occupation was not intensive. The tool inventory indicates hunting or food preparation activities. Some of the historic items could date to the latter part of the nineteenth century. Two landowners, J.T. Truitt and J.T. Rolling, are identified as owning land and having built structures in this area as of 1877 (Brown 1977:181). This site is located within the boundaries of the Longview Farm, and much of the historic material may relate to the activities of this complex. There is an existing livestock shed on the slope below the site. It is a long structure with its south side open and does not appear to have been

used for many years. It appears to post-date the initial construction of Longview Farm.

Some of the historic material from Test Unit 4 appears to predate the construction of the Longview Farm complex and is probably related to one of the small farms which previously occupied the land. None of the material is particularly time diagnostic, but the assemblage is consistent with that expected from a living unit. No evidence of a house structure was noted, however.

Recommendations

Site 23JA173 is represented by a light lithic scatter in the plow zone of a cultivated field. It was not possible to assign a cultural affiliation for the site. There does not appear to be any substantial intact cultural deposits; a relatively heavy mixing of historic items with the prehistoric material is present in some areas of the site. The site is not considered to be significant as further work would not be likely to produce significant data. No further work is recommended for this site.

23JA174

Site 23JA174 is located at an elevation of 890 ft (271 sq m) in Longview Corps Tract 300. The site consists of a scatter of lithic debris 28,000 sq m in extent on top of a north-south trending ridge between the Little Blue River and Mouse Creek. Most of the site area is in pasture; flakes are eroding out of a powerline road which runs the length of the ridge (Fig. 73). Subsurface testing in 1976 recovered no cultural material (Brown 1977:92-93), but the amount of surface material indicated that significant deposits might exist at the site.

Description of Investigations

Testing in 1979 recovered only a small sample of lithics from four one by two m test units. The stratigraphy (Fig. 74) showed a dark gray brown sandy clay with numerous limestone pebbles and fragments (Unit I). An organic-rich zone (Unit II) containing most of the cultural material was noted in the upper 20 to 30 cm. At Test Unit 2 an old pipeline was encountered. The pipeline trench showed up at approximately 30 cm below the surface as a dark stain across the unit. Flakes were recovered to a depth of 50 cm in Test Units 2 and 3, but historic material occurred to the 30-40 cm level in one and the 40-50 cm level in the other. Monitoring of a trenching operation in connection with pipeline recovery operations indicated the presence of a light scatter of material extending to the north approximately 400 m. Examination of Corps of Engineers soil test trenches 100 m to the west of this area failed to recover any cultural material. Much of the historic material seems to be associated with the construction of a pipeline in the 1930's and a set of more recent powerlines through the site. No features, diagnositic artifacts, ceramics, floral or faunal remains, or datable carbon were recovered from 23JA174.

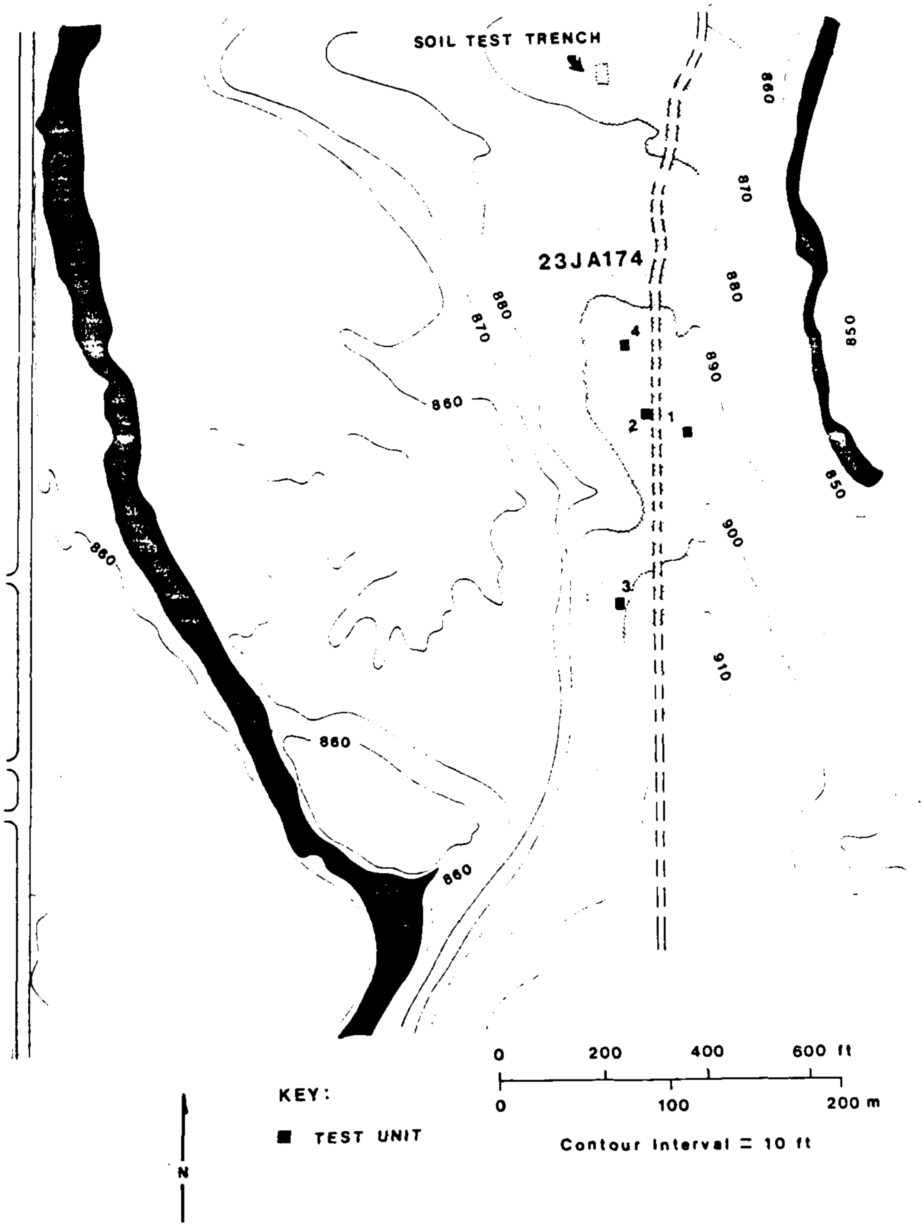


Figure 73. Location of 23JA174.

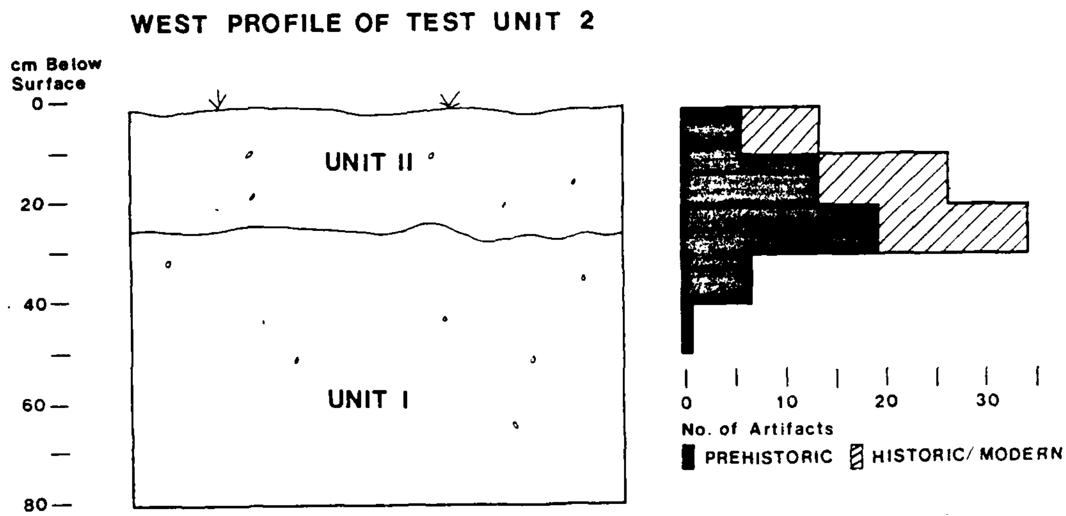


Figure 74. Profile and distribution of artifacts at 23JA174.

Artifact Assemblage

The artifact inventory from the site was limited and consisted of a few edge-modified flakes and lithic manufacturing debris (Table 24).

Chipped Stone Tools

Edge-Modified Flakes (n=7)
Tools consisted of six edge-modified flakes from Test Unit 2 and one from Test Unit 3. They included perforators/gravers and cutting/scraping tools.

Manufacturing Debris (n=75)
Over 60 percent of the flakes from the site were of tan Winterset chert and the remainder was of the gray form. Ninety-seven percent of the debitage was made up of tertiary stage materials. No cores were recovered from the site.

Historic Material

Modern Debris (n=47)
Historic material from the site consisted of shotgun shells, beverage pull tabs, glass fragments, wire pieces, a U.S. nickel 1964, and a number of pieces of tar which apparently were part of the pipeline coating. Most of the material appears to be of recent origin.

Table 24. Artifact assemblage recovered from 23JA174.

	TEST UNITS 1	2	3	4	SURFACE	TOTAL
CHIPPED STONE TOOLS						
Edge-modified flakes		6	1		7	14
MANUFACTURING DEBRIS						
Debitage	5	42	6	3	75	131
HISTORIC MATERIALS	5	37	4	1	47	94
TOTAL	10	85	11	4	129	239

Discussion

Other than a recent historic component, no cultural affiliation can be assigned to the site. There was a very light deposit of material over the top of the ridge with limited tool production (final stage and resharpening) and possibly game processing indicated by the tool inventory. The site has been extensively disturbed by construction activities, and its potential for further productive work is very limited.

23JA175

The site is located in Longview Corps Tract 356. It is at an elevation of 900-950 ft (247-290 m) and covers approximately 34,700 sq m. The site lies in a cultivated field on both sides of a small tributary on the east side of Mouse Creek (Fig. 75). A small sample of lithics was recovered from the site surface in 1976 (Brown 1977: 101).

Description of Investigations

Four one by two m test units were excavated in 1979. Three of the units were placed in the cultivated field in areas where cultural material was found on the surface, and one unit was placed in the pasture to the south of the cultivated field. Only 12 pieces of cultural material were recovered below the surface. Nearly all the artifacts were found in the plow zone.

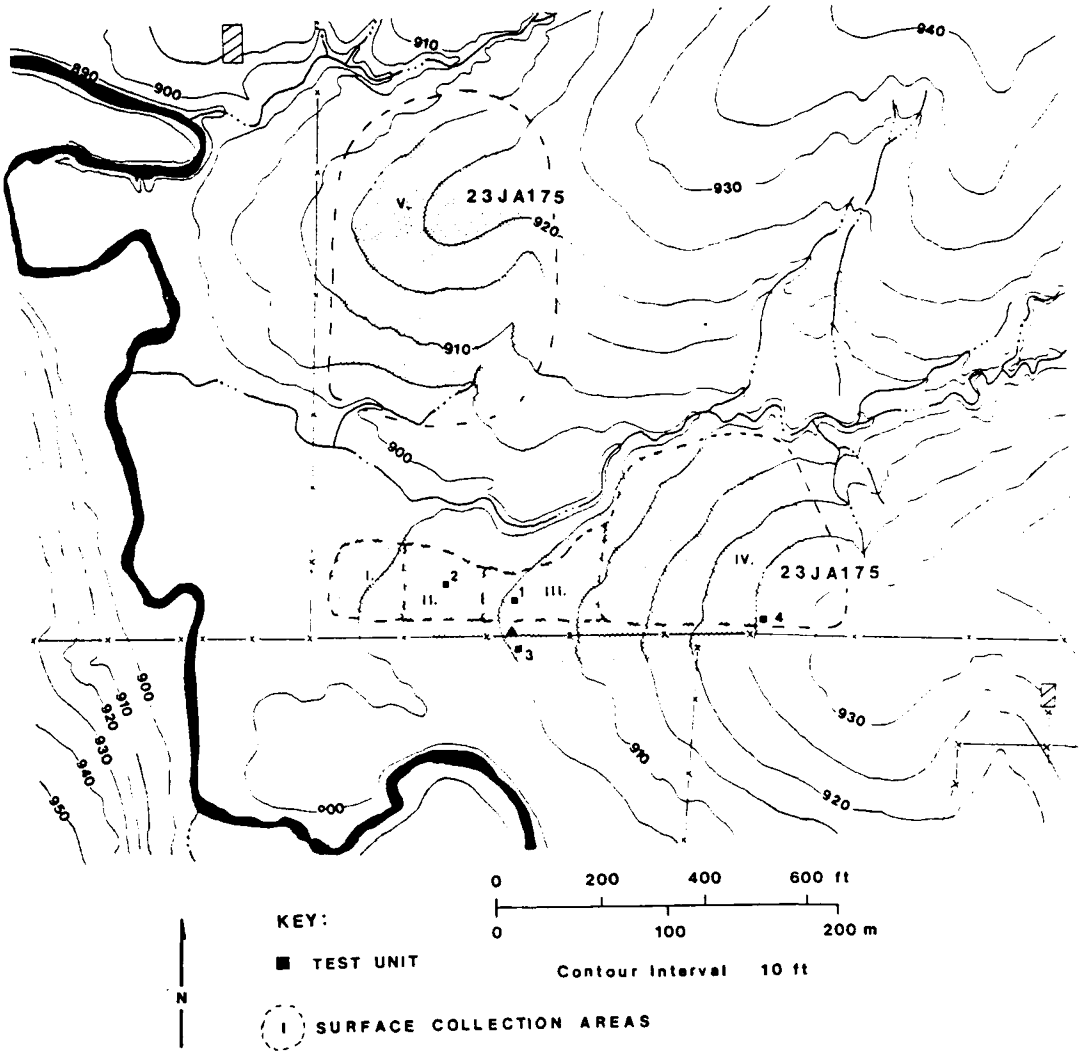


Figure 75. Location of 23JA175.

The soil in the upper 20 cm, or plow zone (Unit VI), was a smooth textured, dark grayish brown silty clay (Fig. 76). Below this was a mottled brown silty clay which extended to at least 70 cm (Unit V). In Unit 4, on top of the knoll (Fig. 76), a red clay (Unit IV) was encountered immediately below the plow zone. In Test Unit 3, in the pasture, there is a 30 cm deep black silty loam (Unit III) which grades into a dark brown silty clay (Unit II). This grades into a lighter brown clay (Unit I) at approximately 60 cm.

The field was planted in soybeans at the time of the testing, but surface visibility was good. The site was arbitrarily divided into five large areas (Fig. 75), and an intensive surface collection was performed. This resulted in the recovery of a large number of flakes, tools, projectile points, and

historic items. No features, ceramics, faunal or floral remains or datable carbon were recovered during the testing.

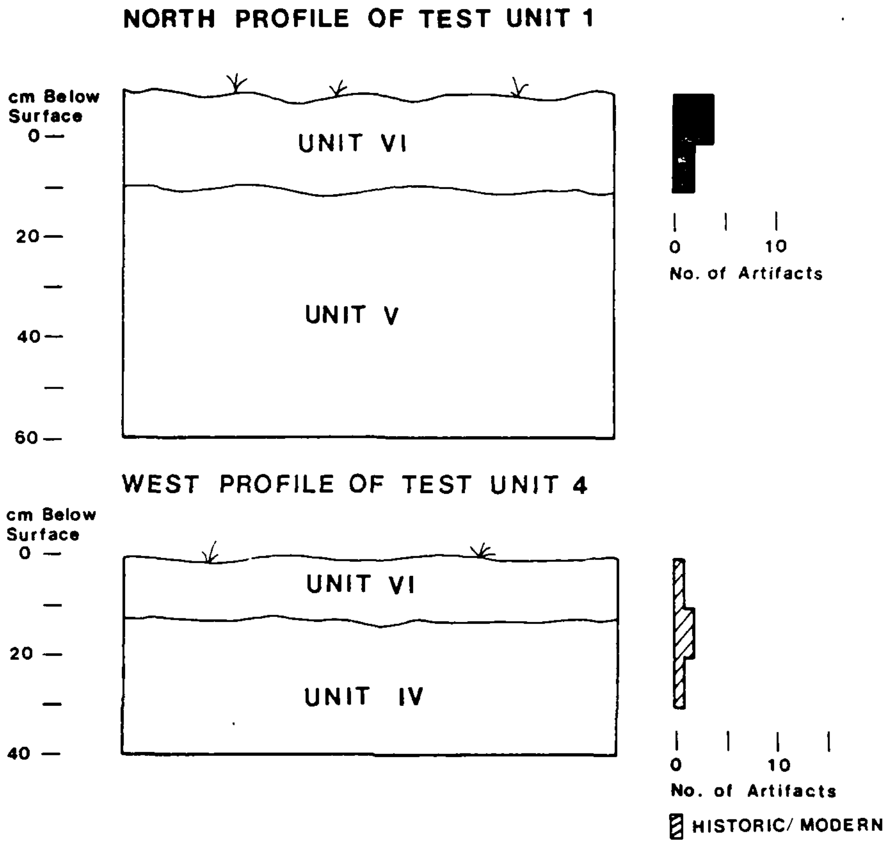


Figure 76. Profile and distribution of artifacts at 23JA175.

Artifact Assemblage

A large quantity of cultural material was recovered from the surface collection and testing of 23JA175. This material consisted of projectile points, bifaces, edge-modified flakes, and historic items as well as a large collection of manufacturing debris (Table 25).

Chipped Stone Tools

Projectile Points (n=7)

Seven projectile points or point fragments were recovered from the surface collection of 23JA175. The midsection of a Nebo Hill-like point (Fig. 77a) was recovered from the east end of the site. It shows impact fracturing on the distal end, has convex blade edges and a moderately thick cross section, and is made of a gray, banded Winterset chert. There is also one small midsection or fragment of a Nebo Hill-like projectile point (Fig. 77b) from the western portion of the cultivated field. Also recovered was a contracting stemmed lanceolate point (Fig. 77c), similar to points recovered from the Late Archaic El Dorado phase at the Williamson site located in east central Kansas

Table 25. Artifact assemblage recovered from 23JA175.

	TEST UNITS	COLLECTION AREA I	II	III	IV	V	GENERAL SITE AREA	TOTAL
CHIPPED STONE TOOLS								
Projectile Points			1	1	1	3	1	7
Bifaces		3	2	1	3	9		18
Edge-Modified Flakes	3		7	11	14	22	10	67
Total	3	3	10	13	18	34	11	92
MANUFACTURING DEBRIS								
Cores		1	2	2		3		8
Debitage	4		83	204	138	198	64	691
Total	4	1	85	206	138	201	64	699
FAUNAL REMAINS			1					1
HISTORIC MATERIAL				2	123			125
TOTAL	7	4	96	221	279	235	75	917

Figure 77. Artifacts from 23JA175: (a-g) projectile points, (h) projectile point reworked into drill, (i-j) biface celts, (k-l) bifacial scrapers.

(Schmits 1980), and a large, fragmentary corner-notched base from the western portion of the cultivated field (Fig. 77d). Three projectile points were found on the surface north of the small tributary stream. One of these was an alternately beveled contracting stemmed point (Fig. 77e) similar to those attributed to the Late Archaic and Woodland Langtry complex (Martin 1976:18-22, Chapman 1980). These forms were also a lanceolate biface of gray Winterset chert with a single shallow side notch (Fig. 77f), the distal portion of a small dart point of tan Winterset, and a dart point midsection of gray Winterset (Fig. 77g).

Bifaces (n=18)

A large sample of bifaces was recovered from the site. The sample exhibits considerable morphological heterogeneity and appears to illustrate a wide variety of tasks. One biface is a corner-notched projectile point which has been reworked into a drill (Fig. 77h). In addition are two roughly lanceolate bifaces of Winterset chert, one tan and one gray, which, because of their proximal end narrowing, appear to be hafted celts or digging tools (Fig. 77i-j). Other bifaces from the collection include two biface fragments with scraping wear on one or more edges (Fig. 77k-l) and two thin lanceolate biface fragments which may have served as knives (Fig. 78a-b). There is not sufficient wear on these latter to assign definite functions, however. The remainder appear to have been bifacial blanks (Fig. 78c-f).

Edge-Modified Flakes (n=67)

Of the 67 edge-modified flakes recovered from the site, 40 (60 percent) have at least one straight cutting or scraping edge with the latter being more common. Perforator or graver tips were found on 21 (30.4 percent) of these tools, and notches occurred on eight (11.5 percent). Both gray Winterset and tan Winterset chert were utilized for these tools.

Manufacturing Debris (n=699)

A large sample of lithic debris on eight cores were recovered from the site. The cores were mainly irregular or discoidal in form and were split evenly between gray and tan Winterset. The lithic debitage was 70 percent gray Winterset and 30 percent tan with six flakes of exotic material noted. Of the tan Winterset chert in the sample 34 percent was reddened.

Faunal Remains

Unworked Bone (n=1)

One bone fragment was recovered from the surface of Area II; it appeared to be modern in origin.

Historic Material

Historic Debris (n=125)

Historic material included bottle fragments (Fig. 78 g-j), crockery, nails, a horseshoe, and other metal items. This component was confined to the eastern end of the site on top of a low knoll near the present locations of a farmhouse and outbuildings. It appears to be related to a late nineteenth and early twentieth century occupation. Much of the glass appears to date from the last quarter of the nineteenth century.

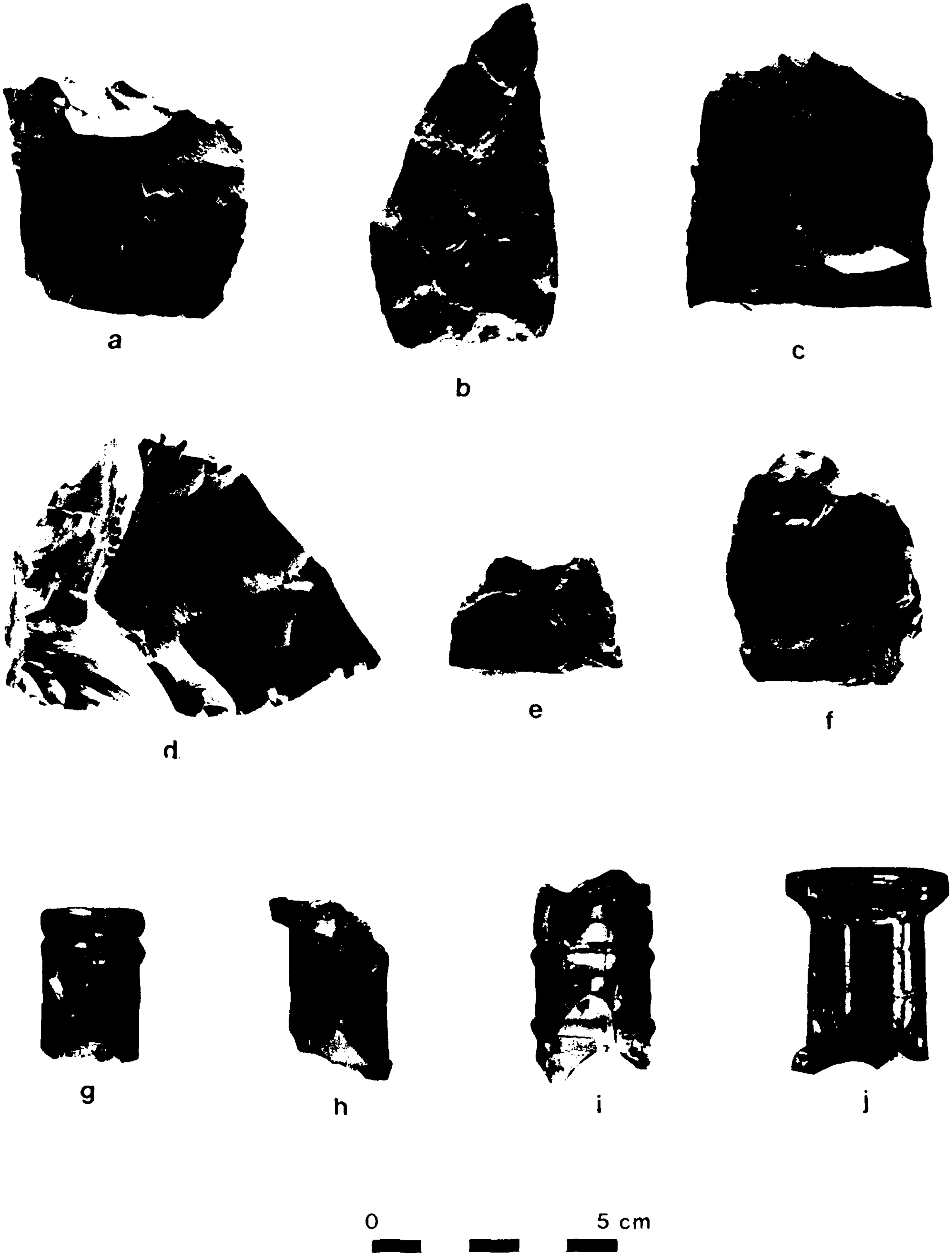


Figure 78. Artifacts from 23JA175: (a-f) bifaces, (g-j) glass bottle fragments.

Discussion

The site appears to represent a Late Archaic occupation with a possible Middle Woodland component and a historic component on the east end of the site. The large number of bifaces and marginally retouched tools in the assemblage indicates a probable habitation site with a number of activities represented. These include lithic tool manufacture, hunting, and wood or bone working, as well as generalized cutting and scraping activities. There has been considerable erosion in the cultivated field, and any features which may have been present appear to have been destroyed by plowing and/or erosion. The site is apparently known to local collectors, and it is very likely that collecting has biased the sample of material from the site. The historic component appears to be related to the farmstead still located just to the south of the site area. There are a farmhouse and related outbuildings presently located on the top of the knoll, and reports of at least one structure built in the area prior to 1977.

Recommendations

This site contained a great deal of cultural material and appears thus to represent an intensive occupation. The site is, however, confined to the plow zone and has been disturbed by both plowing and erosion. The site has also been intensively collected by local amateurs. It is unlikely that further archaeological investigations would be particularly productive. The site is not considered significant, and no further work is recommended.

23JA177

23JA177 is a small site located on the crest of a high ridge 300 m south of Mouse Creek (Fig. 79). It is located in Longview Corps Tract 357 at an elevation of 965 ft (294 m). The site covers an area of approximately 2200 sq m based on the extent of the surface material and subsurface recovery. There is good visibility in several directions from the site. In 1976 the University of Kansas survey crew recovered the base of a Nebo Hill point (Fig. 80a) and a large lanceolate contracting-stemmed point (Fig. 80b). The contracting-stemmed point has been identified by Brown (1977:101-102) as a Middle Woodland projectile point, but it also has morphological similarities to projectile points from the Shields site attributed to the Early Woodland by Shippee (1967:31-33) and to Late Archaic points from Rodger's Shelter (Ahler 1971).

Description of Investigations

Testing in 1979 included further surface examination in eroded areas on the site and placement of four one by two m test units to determine if buried cultural deposits were present. Only a few additional prehistoric cultural items were recovered, but a moderately heavy deposit of historic material was uncovered.

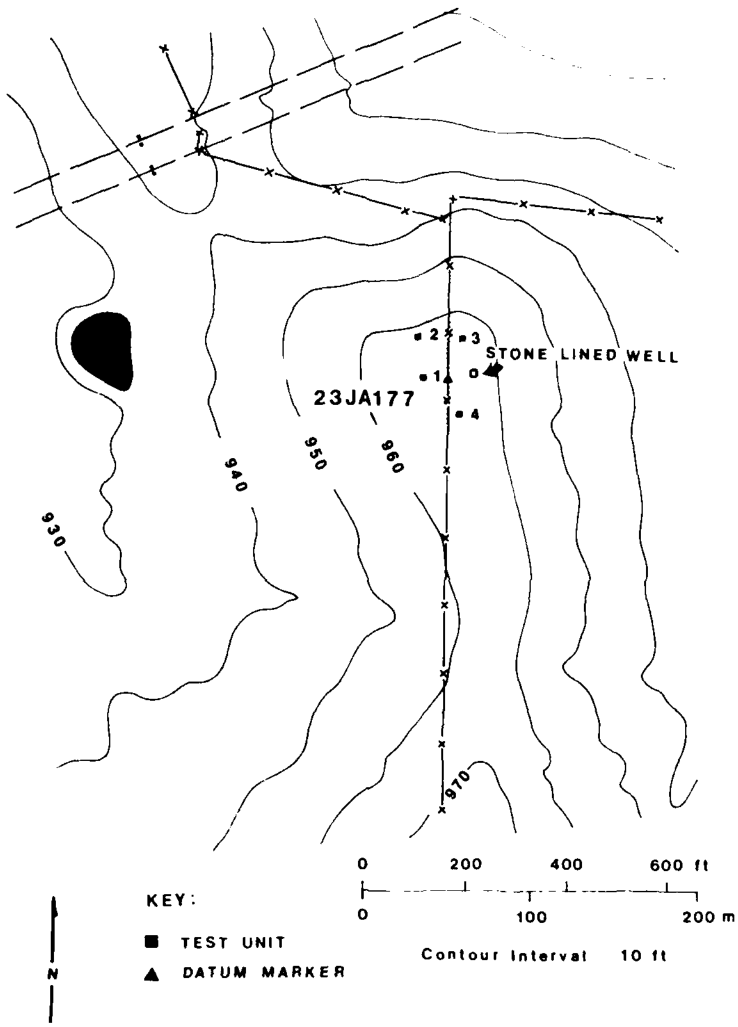


Figure 79. Location of 23JA177.

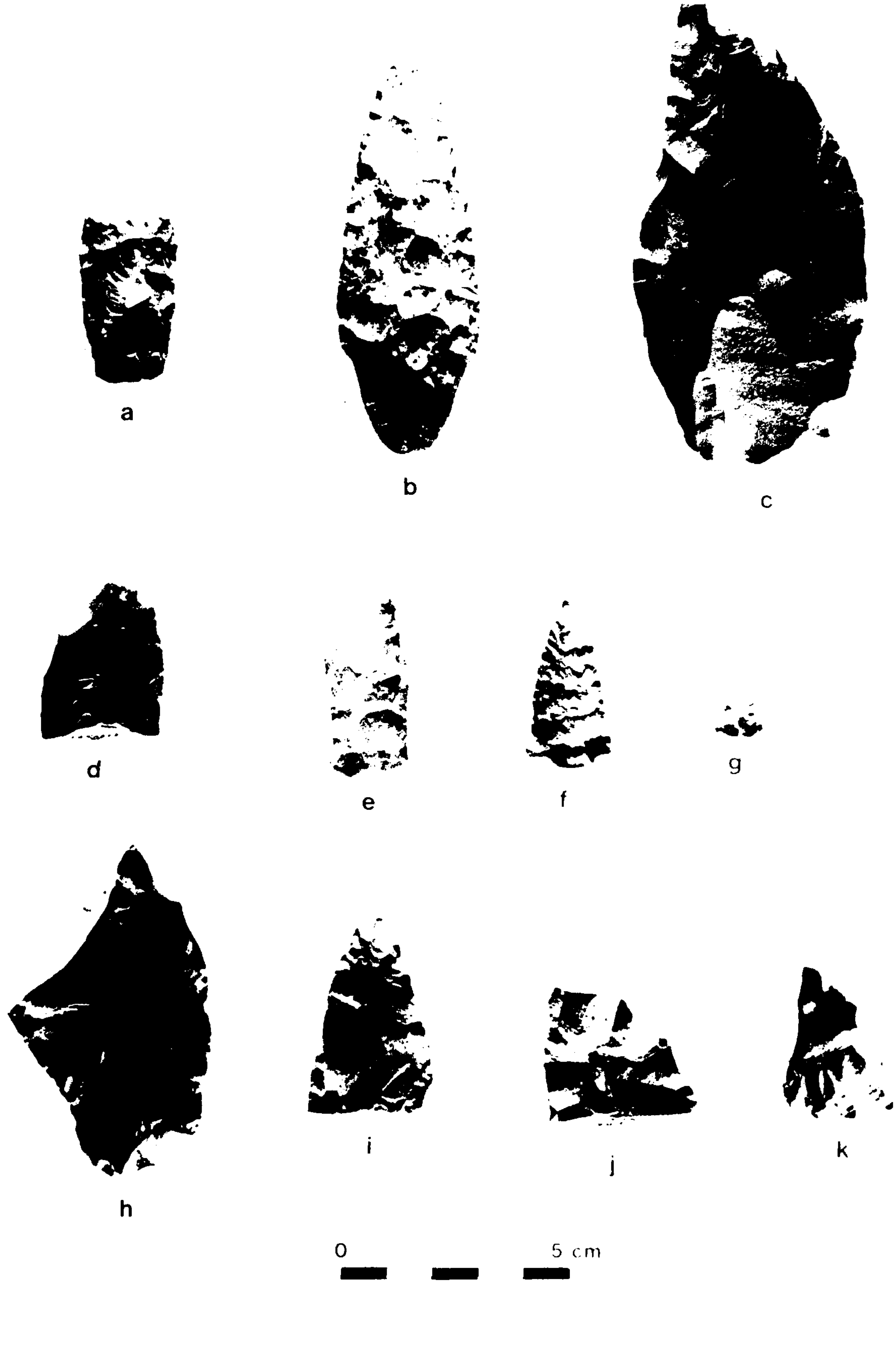


Figure 80. Artifacts from 23JA177 and 23JA178: (a-b) projectile points from 23JA177, (c-d) bifaces from 23JA177, (e-g) projectile points from 23JA178, (h-k) bifaces from 23JA178.

Two test units were excavated on each side of the north-south fence which bisects the ridge. The plow zone (Unit III) was from 15 to 20 cm deep and was a dark grayish brown sandy clay mottled with orange and yellow. Plow scars could be discerned at the bottom of this zone in two of the units. Below this was a dark yellowish brown sandy clay with orange mottling (Unit II) which graded into a gray and orange mottled clay (Unit I) at about 30-35 cm below the surface (Fig. 81). Unit I extended to at least 60 cm. Prehistoric cultural material was recorded from only the test units on the highest part of the site (Test Units 2 and 3), and the material was all in the upper 20 cm. Historic items came from the upper 20 cm in all units. No features, diagnostic artifacts, prehistoric ceramic, faunal or floral remains, or datable carbon were recovered from the testing.

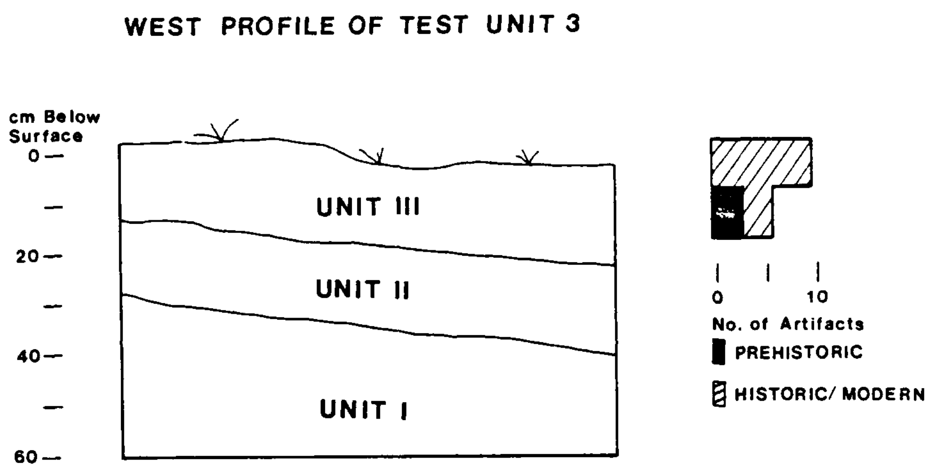


Figure 81. Profile and distribution of artifacts at 23JA177.

Artifact Assemblage

The prehistoric cultural material recovered from the site consisted entirely of lithic tools, manufacturing debris, and a large sample of hematite. The distribution of cultural material is shown in Table 26.

Chipped Stone Tools

Bifaces (n=2)

Both of the bifaces recovered from 23JA177 came from the surface collection. One of these is a large lanceolate blank of brown Winterset chert with a break at the tip which has been retouched into a perforator or drill (Fig.

80c). It is made of light gray and brown banded Winterset chert. The second biface is the tip of a small lanceolate blank of tan Winterset (Fig. 80d).

Table 26. Artifact assemblage recovered from 23JA177.

	TEST UNITS 1	2	3	4	SURFACE	TOTAL
CHIPPED STONE TOOLS						
Bifaces					2	2
Edge-modified flakes					3	3
Total					5	5
MANUFACTURING DEBRIS						
Debitage		1	3		3	7
Total		1	3		3	7
MINERALS		14	15			29
HISTORIC MATERIALS	18	3	13	13	1	48
TOTAL	18	18	31	13	9	89

Edge-Modifed Flakes (n=3)
Three edge-modified flakes were recovered from the surface. Two are of Winterset chert; the third is of a pink and white exotic chert. All have straight or slightly incurvate working edges with scraping type wear indicated.

Manufacturing Debris (n=7)
The manufacturing debris consists of a very small sample of tan and gray Winterset flakes from the test units and the surface.

Mineral

Hematite (n=29)
The two test units on the ridge crest also contained 29 fragments of hematite. None of these shows definite signs of being worked but one fragment

has several roughly parallel scratches on one surface. The hematite was all in the upper 20 cm of the deposit.

Historic Material

Historic Debris (n=48)

Historic material was recovered from the plow zone in all the test units and included fragments of brick, glass sherds, crockery, nails, and metal parts. There is also a stone lined well shaft on the east side of the fence. T.D. Cooper is reported to have built a structure in this area prior to 1877 (Brown 1977:181).

Discussion

The site seems to represent a very limited, short term occupation during the Late Archaic with a possible additional occupation in the Middle Woodland. It likely represents a small hunting camp, game lookout, or other limited activity locus. The historic cultural material appears to relate to a living structure probably in the area near the well. There were a few bricks in the area between the well and the fence, and this may indicate the location of the building. None of the material is temporally diagnostic, but it is consistent with the type of material expected near a habitation structure. It is probably related to the T.D. Cooper farm.

Recommendations

Site 23JA177 contains only a small amount of prehistoric material in a shallow deposit. This is thoroughly mixed with historic material. It appears to be one of a number of Late Archaic upland sites and may also have a later Middle Woodland component as well, although the evidence for chronological placement is minimal. The amount of prehistoric or historic material remaining would not justify further investigation. The site is not considered significant, and no further work is recommended.

23JA178

Site 23JA178 is located in Longview Corps Tract 248 at an elevation of 920 ft (280 m). The site is located at the west edge of a cultivated field on the east side of the Lumpkin Fork of the Little Blue River (Fig. 82). Cultural material is largely restricted to the surface of a low rise of lighter colored soil and extends into the wooded area to the west of the fence for a short distance. A moderately heavy scatter of lithics covers an area of approximately 2025 square meters in the plowed field. Brown (1977:99) recovered one biface from the site surface.

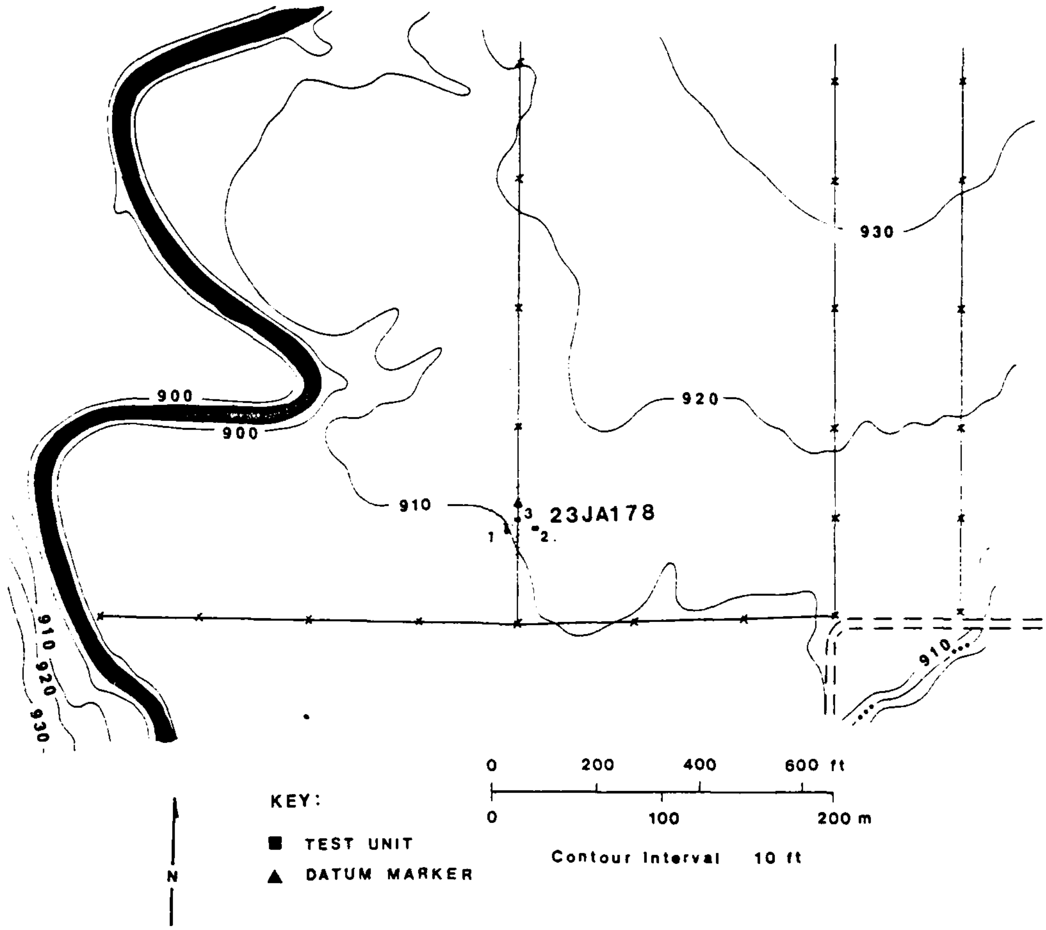


Figure 82. Location of 23JA178.

Description of Investigations

Two one by two m test units were excavated in the area of the surface scatter in order to test for possible buried deposits. One unit (Test Unit 2) was excavated in the area of highest debitage density in the cultivated field and, the other was placed just off the cultivated area at the northern edge of the lithic scatter. The soil in these two units was similar (Fig. 83) with an upper dark grayish-brown sandy clay plow zone (Unit II) to 20-25 cm below the surface and a dark brown mottled sandy clay (Unit I) extending to at least 60 cm below this. Reddish brown oxide concentrations were common throughout both units. Lithic debitage was recovered from both test units down to the 20-30 cm levels, just onto the top of the lower soil zone.

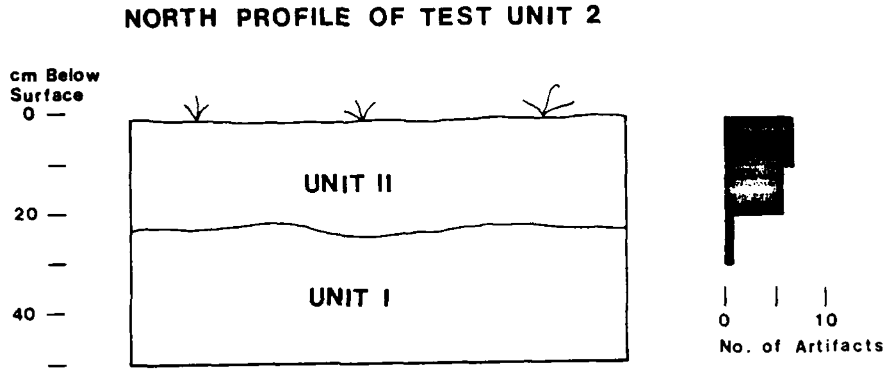


Figure 83. Profile and distribution of artifacts at 23JA178.

A series of 12 shovel tests were dug in the wooded area to the west of the flake concentration. Two of these tests directly west of the concentration produced three pieces of debitage. A one by two m unit (Test Unit 1) was excavated in this area, but no cultural material was recovered from this unit. The soil here was similar to that in the other units except that there was no distinct plow zone transition, and the upper 20 cm was darker in color than that in the cultivated field. The testing did not reveal any features, ceramics, floral remains, or datable carbon.

Artifact Assemblage

The artifacts from 23JA178 consisted of lithic tools, debitage, and four bone fragments. The majority of the material came from the surface of the cultivated field. Table 27 shows the distribution of the cultural material.

Chipped Stone Tools

Projectile Points (n=3)

Three projectile points were recovered from the surface. One of these is the base of a Nebo Hill point of dark gray Winterset chert (Fig. 80e). It is broken at the base corners, but its basal margin was apparently incurvate. It is similar to the points from 23JA35 and 23JA170 (this volume). A small distal section of a corner-notched dart point with slightly excurvate blade edges was also recovered (Fig. 80f). It is made of a pink non-local chert and is thin with precise flaking. It exhibits a small impact fracture at the tip. The third projectile point is a tiny corner-notched arrow point of gray Argentine chert (Fig. 80g). It is triangular in outline with straight blade edges. The base has been broken off. Both of these points appear to be

Middle or Late Woodland types, the latter being similar to the Scallorn type points (Martin 1976:40-41).

Table 27. Artifact assemblage recovered from 23JA178.

	TEST UNITS 1	2	SHOVEL CUTS	SURFACE	TOTAL
CHIPPED STONE TOOLS					
Projectile Points				3	3
Bifaces				5	5
Edge-Modified Flakes	1	1	1	24	27
Total	1	1	1	32	35
MANUFACTURING DEBRIS					
Cores			1	9	10
Debitage	13	9	1	291	314
Total	13	9	2	300	324
MINERALS				1	1
FAUNAL REMAINS				4	4
TOTAL	14	10	3	337	364

Bifaces (n=5)

Two thin biface knives of Winterset chert were recovered. One is the tip of a small lanceolate which could also be a projectile point fragment (Fig. 80h). It does, however, have slight attrition wear which indicates use as a cutting tool The other is a large, thin lanceolate base fragment with a large concave portion on one edge (Fig. 80i). It shows slight wear indicating cutting utilization. Two other bifaces are distal fragments of small rough tools (Fig. 80j-k). One of these is of a white exotic chert and the other is of heated Argentine. There is also one small bifacial fragment of dark gray Winterset.

Edge-Modified Flakes (n=27)

There were 24 small edge-modified flakes from the surface, one from a shovel cut and one each from Test Units 2 and 3. Among these are five utilized projections and three notches. The majority of tools exhibited uni-

directional step fracturing and attrition, indicating force applied perpendicularly to the working edge in a scraping motion. The edges were generally small, and the largest percentage was straight. Tan Winterset or Argentine chert made up 52 percent of these tools. Two of these were heated Argentine.

Manufacturing Debris (n=234)

Ten cores were recovered from the site. Nine of these came from the surface, and one from a shovel cut. Seven cores were of tan Winterset chert; the other three were gray Winterset. Two of the tan Winterset cores were roughly discoidal in form; the others were all irregularly shaped.

Gray Winterset chert made up 55 percent of the debitage sample, tan Winterset chert made up 31 percent and heated tan Winterset 13 percent. There was one flake of exotic white chert noted. The debitage was predominantly tertiary stage flaking debris, the presence of several tan Winterset cores suggests that primary stage lithic reduction took place on the site.

Mineral

Hematite (n=1)

One large hematite fragment was recovered from the surface. It is heavily weathered and has no striations visible on it, although one surface is relatively flat and may have been ground.

Faunal Remains

Unworked Bone (n=4)

Four badly weathered bone fragments were recovered from the site surface. They are not identifiable, and, as surface finds, they are not reliable indicators of prehistoric activity.

Discussion

The site appears to be restricted to a small area on a knoll which may represent a terrace remnant. The soil from the knoll is light in color and is similar to sediments in other T-1 terrace fills in the Little Blue Valley. Projectile point types present indicate Late Archaic and Middle or Late Woodland components on the site, but the surficial nature of the deposit makes impossible separation of the two. The site likely represents limited, subsistence related activities. The presence of projectile points and edge-modified cutting and scraping tools could indicate a game processing activity. The debitage and cores on the site indicate a game processing activity. The debitage and cores on the site indicate that there was some primary lithic tool production occurring here. There may have been some sources of tan Winterset chert nearby, although none are definitely known at this time. The potential for further work at the site is limited due to shallow nature of the deposits and the small amount of material available below the surface.

Recommendations

The site contains only a shallow and mixed deposit of Late Archaic and Woodland materials. The largest part of the site appears to be in a cultivated field and so has been heavily disturbed. Further investigations at 23JA178 would be unlikely to recover significant data, and no further work is recommended.

23JA181

23JA181 is located in Longview Corps Tract 247. It is at an elevation of 930-950 ft (263-270 m). The site is located in a cultivated field on a bluff slope approximately 50 m south of the Little Blue River and 100 m east of a small tributary stream. The 1976 survey crew recovered a small sample of flakes and tools from the surface of the slope and reported cultural material to a depth of 15 cm below the surface (Brown 1977:97).

Description of Investigations

The site exhibited a moderately heavy surface scatter in the plowed field. Tools, projectile points, and debitage are scattered in two major concentrations on adjacent lobes of the bluff (Fig. 84). Surface reconnaissance in eroded and disturbed areas on the brush covered slope to the north of the plowed field recovered no additional material. Five one by two m test units were excavated in the site to test for intact subsurface deposits. Test Units 1-3 were placed in the area of the western debitage concentration, and Units 4 and 5 were excavated in the area of the eastern concentration.

Unit 1 was located near the base of a large tree in the cultivated field, in an area which apparently had not been plowed in the past. Unit 2 was located in the cultivated portion of the field, and Unit 3 was located just to the north of the presently cultivated field in a brush and grass covered area. Of these only Unit 1 produced any cultural material. A light deposit of debitage was recovered to a depth of 50 cm below the surface. The unit exhibited a great deal of disturbance due to rodent activity. The sediments are similar in all three units (Fig. 85) with a dark brown clay loam, located over a reddish clay zone (Unit I). The latter extended to at least 70 cm in Test Unit 3.

Test Unit 4 was located in the eastern concentration of lithics on the highest portion of the site in the cultivated field. The soil is similar to that in Units 1-3. Debitage and tools were recovered in the 20-30 cm level. Test Unit 5 was located north of the fence in an area which may not have been cultivated in the past. The dark brown clay loam (Unit II) extended to a depth of approximately 30 cm and the reddish clay zone (Unit I) went down to at least 60 cm (Fig. 85). Debitage and tools were recovered to a depth of 55 cm and the densities of material were relatively high. Over 70 cultural items were recovered from the unit, including three bifaces and seven marginally retouched flakes. The highest densities of material were in the upper 30 cm but eight flakes were recovered from the 50-60 cm level.

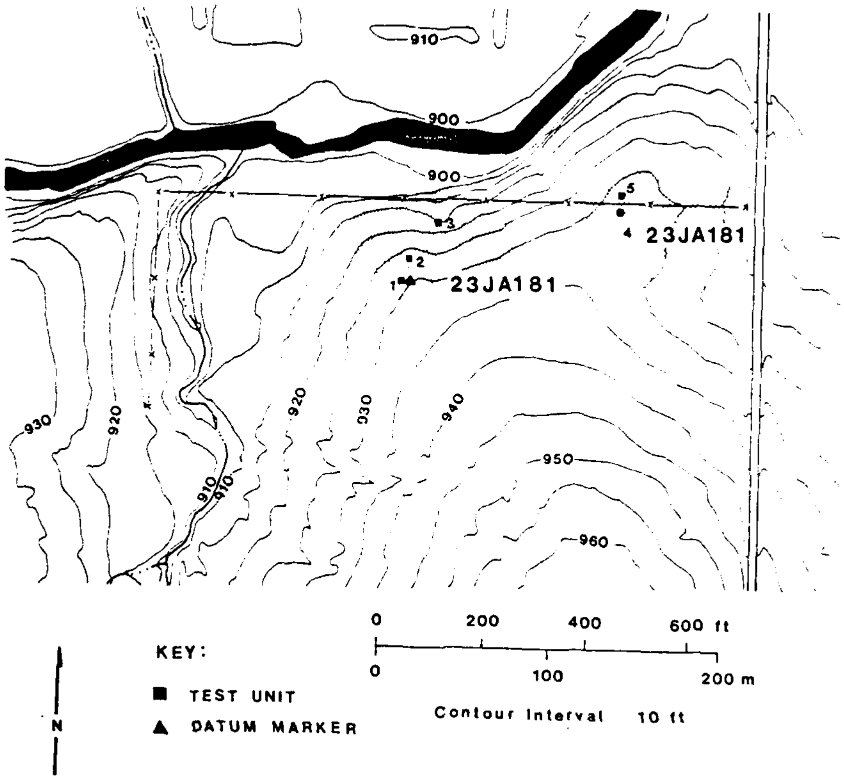


Figure 84. Location of 23JA181.

No features, ceramics, faunal or floral remains, or datable carbon were recovered from the site. Test excavations at the site indicate the possible presence of undisturbed deposits to the north of the cultivated area.

Artifact Assemblage

The artifacts recovered from 23JA181 included projectile points, bifaces, endscrapers, edge-modified flakes, and lithic manufacturing debris. The majority of the material came from the surface collection, but some was recovered below the surface (Table 28).

Chipped Stone Tools

Projectile Points (n=3)

Three identifiable projectile points or point fragments were recovered from the surface of the eastern lithic concentration. One is the basal

section of a narrow point with an expanding stem and concave base (Fig. 86a). It is similar to Dalton points discussed by Chapman (1975) and particularly to the final stage of reworking of Dalton points as reported by Goodyear (1974). It is made of a tan chert with reddening on portions of the base. The other projectile points are a triangular corner-notched dart point of non-local white chert (Fig. 86b), and a basal stem fragment of a corner-notched dart point of pink chert. These latter to be Middle or Late Woodland points.

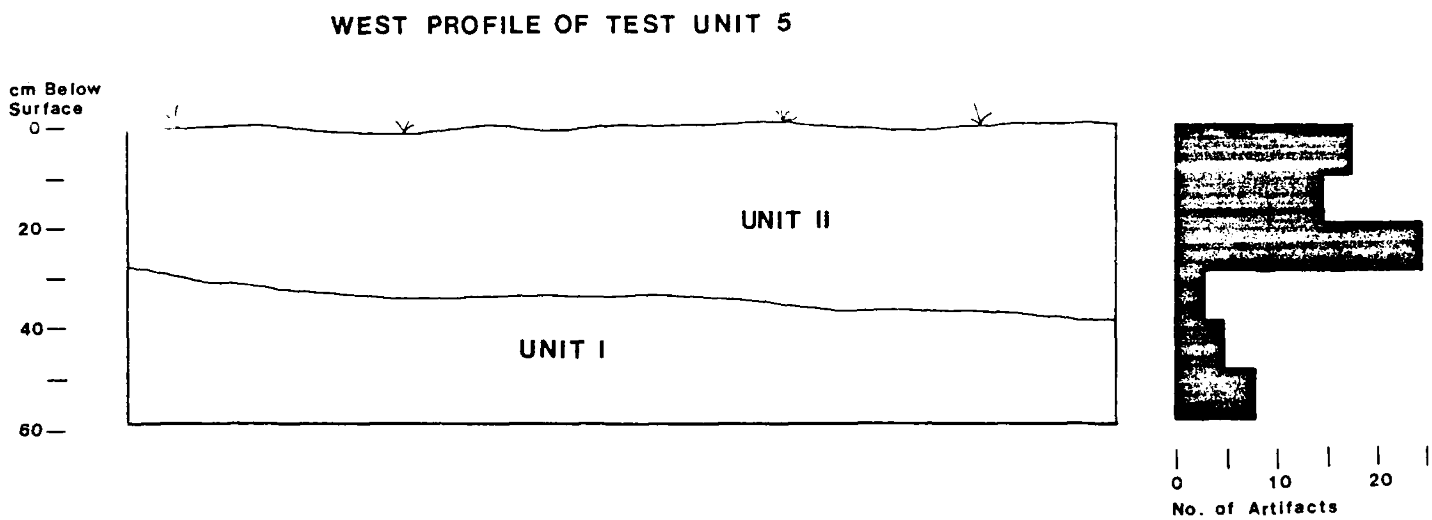


Figure 85. Profile and distribution of artifacts at 23JA181.

<u>Bifaces</u> (n=9)

Nine bifacial artifacts were recovered from the site, two of which are probably small projectile point fragments. One thin biface of Argentine chert has wear which indicates use as knife (Fig. 86c). Another of the same material has been shattered, and the broken edge utilized as a scaper (Fig. 86d). The others are small, rough blanks or possible exhausted cores of gray and tan Winterset chert (Fig. 86e-h).

<u>Unifaces</u> (n=1)

One endscraper (Fig. 86i) was recovered from the surface of the east concentration. It is made of a gray white non-local chert and has a relatively thin cross section.

Table 28. Artifact assemblage recovered from 23JA181.

	TEST UNITS 1	3	4	5	EAST CONCENTRATION SURFACE	WEST CONCENTRATION SURFACE	GENERAL SURFACE COLLECTION	TOTAL
CHIPPED STONE TOOLS								
Projectile Points					3			3
Bifaces				3	5		1	9
Unifaces					1			1
Edge-Modified Flakes			4	7	11	3	11	36
Total			4	10	20	3	12	49
MANUFACTURING DEBRIS								
Cores							4	4
Debitage	6		33	63	241	84	20	447
Total	6		33	63	241	84	24	451
HISTORIC MATERIALS		1		1				2
TOTAL	6	1	37	74	261	87	36	502

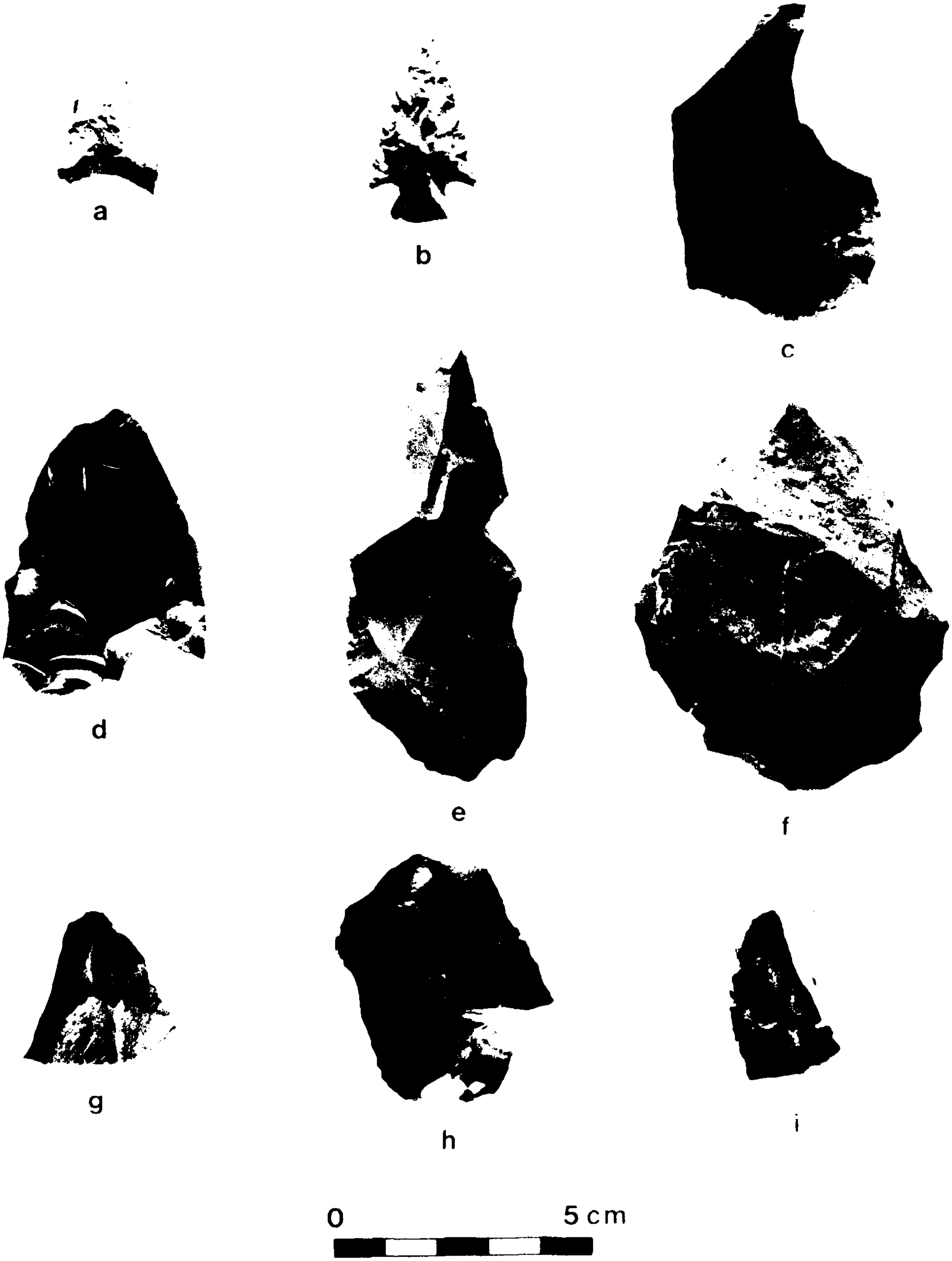


Figure 86. Artifact assemblage from 23JA181: (a) Dalton-like projectile point, (b) projectile point, (c-d) bifacial scraper, (e-h) bifaces, (i) end scraper.

Edge-Modified Flakes (n=36)
A total of 36 edge-modified flakes were recovered from the site, made entirely of Winterset (37 percent) and Argentine (63 percent) cherts. Included were small cutting and scraping tools, notches, and 12 utilized projections. Nine of the projections showed signs of deliberate reworking to form the tip and three were simply sharp, natural points which had been used as a graver or perforator.

Manufacturing Debris (n=451)
Four cores were recovered from the site. They were all from the initial surface reconnaissance and are all irregularly shaped chunks with a few flakes removed. Three are of gray Winterset chert, and the fourth is Argentine.

The rest of the manufacturing debris consisted of lithic debitage, most of which came from the surface of the east concentration (see Table 28). Winterset chert made up 56 percent of the debitage from this surface collection, Argentine chert made up 30 percent, and 14 percent was of reddened Argentine. There was only one flake of white exotic material from the surface collection, indicating that the projectile points were not manufactured on the site, or at least not in the area of the cultivated field.

Historic Material

Modern Debris (n=2)
The historic material recovered from the site consisted of one fragment of a barbed wire fence and a piece of leather strap with machine sewn seams on it. Both were from the upper 10 cm of Test Units 3 and 5 respectively. They both appear to be related to modern farming activities on the site area.

Discussion

23JA181 appears to represent an intensive occupation of the slope of the ridge with both Early Archaic and Woodland components. The cultural material appears to represent a variety of activities consistent with a habitation site. There is evidence of hunting, hide preparation, and intensive lithic manufacture as well as indications of woodworking and food preparation. At this time it is not possible to determine if the spatial separation of the two debitage clusters is due to cultural factors or to post occupational erosion. There are, however, undisturbed deposits north of the cultivated area which could contain very early cultural material.

Recommendations

There is a possibility that undisturbed Early Archaic deposits may exist to the north of the cultivated field; these could be particularly valuable for study of the chronology and settlement patterns in the Little Blue Valley and the Kansas City area in general. The cultural materials are relatively dense in the eastern surface scatter and contain a wide variety of tools compared to most of the sites in the project area. The site produced one endscraper, a rare item in the Little Blue draiage, and the number of other tools indicates an intensive occupation of the site. The site is thus significant. The

recommended mitigation option is preservation. Preservation should be possible as there appear to be no planned developments on the site area. If it is not, however, the site should be excavated. Such excavations should focus on the area north of the cultivated field where the undisturbed deposits are located. They should be oriented toward the recovery of chronologic information, in the form of in-situ diagnostic material and datable carbon, and the recovery of possible faunal or floral remains and cultural features. Such information could provide valuable information on the settlement and subsistence patterns of the Early Archaic and Woodland periods.

23JA182 ACORN SHELTER

23JA182 is in Blue Springs Corps Tract 155. It is a small rockshelter on the end of a ridge about 45 m north of a tributary of the East Fork of the Little Blue River (Fig. 87). A second small stream runs along the base of the slope below the overhand. The shelter is at an elevation of 840 ft (256 m) and covers an area of approximately 300 sq m. In 1976 a number of flakes and tools were recovered from the area around several large blocks of limestone fall rock in front of the shelter (Brown 1977:66-67).

Description of Investigations

A series of shovel cuts dug in front of the overhang in 1979 recovered a number of flakes and three bifaces. Additional shovel tests farther down the slope below the shelter did not recover any more cultural material. Two one by two m test units were excavated in the area around the large fall rock (Fig. 88) in front of the present overhang. The surface inside the existing dripline appears to be bedrock. The shelter likely extended outward for some distance prior to the breaking off of the large blocks.

The soil profiles were similar in both test units (Fig. 89). The upper 50 cm of the units was a loose, friable black clay loam with poorly sorted limestone pebbles and cobbles and large limestone rockfall fragments (Unit III). This zone became markedly thinner downslope, becoming less than 30 cm thick at the lower end of Test Unit I. Below this there was a marked decrease in the percentage of rock (Unit II), although the soil was approximately the same as that in the upper zone. In Test Unit 1, the eastern of the two units, there was also a yellowish-brown clay containing weathered shale fragments. The clay occurred at approximately 50 cm in the lower portion of the excavation (Unit I). Cultural material extended into Unit II in both test units. Root disturbance was heavy throughout the profile of the units, and large rock fall was noted to the bottom of both. High densities of debitage and tools were recorded in both Test Unit 1 and Test Unit 2. The cultural material in Test Unit 1 extended to the 50-60 cm level, and that in Test Unit 2 also contained a large amount of reddened limestone which may indicate the presence of hearths, although no features were encountered in either unit. No diagnostic projectile points or ceramics were recovered, and no datable carbon was found during the testing. Figure 90 provides a general view of Acorn Shelter.

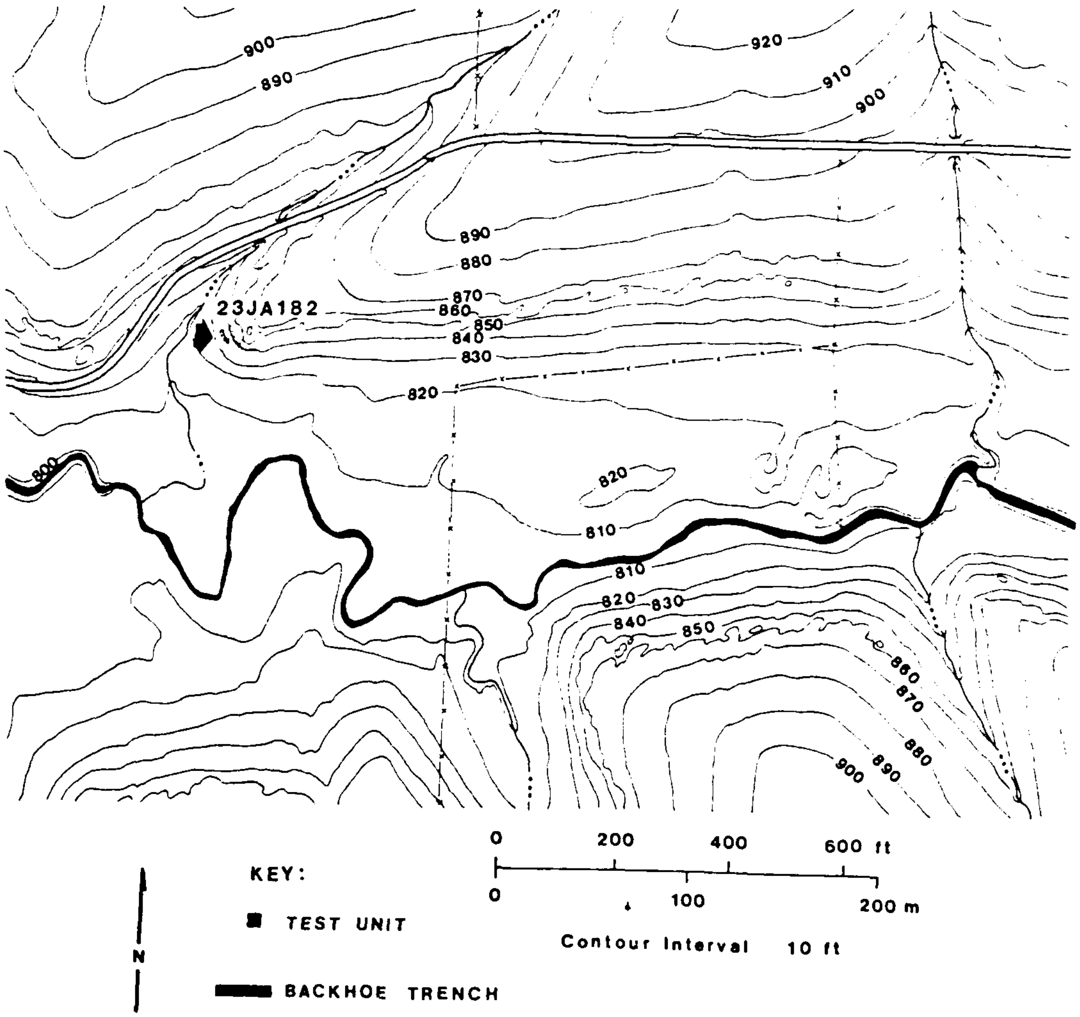


Figure 87. Location of Acorn Shelter (23JA182).

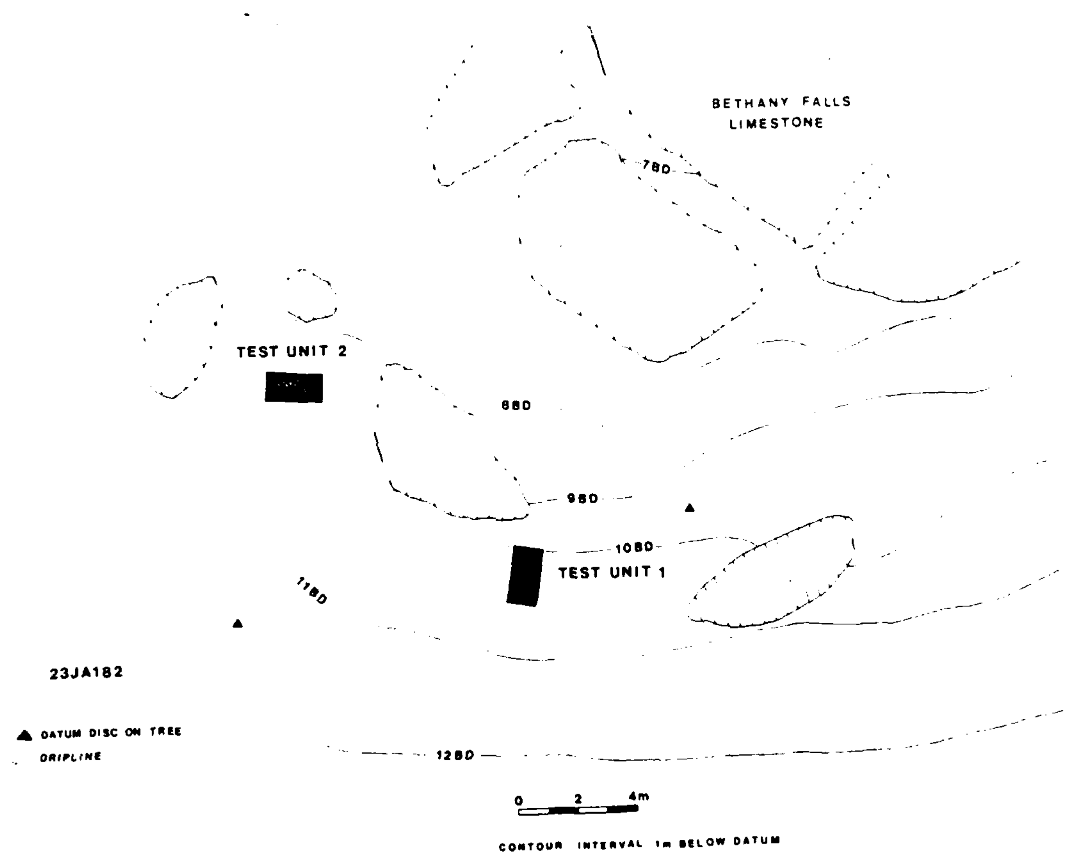


Figure 88. Plan of 23JA182 and location of test units.

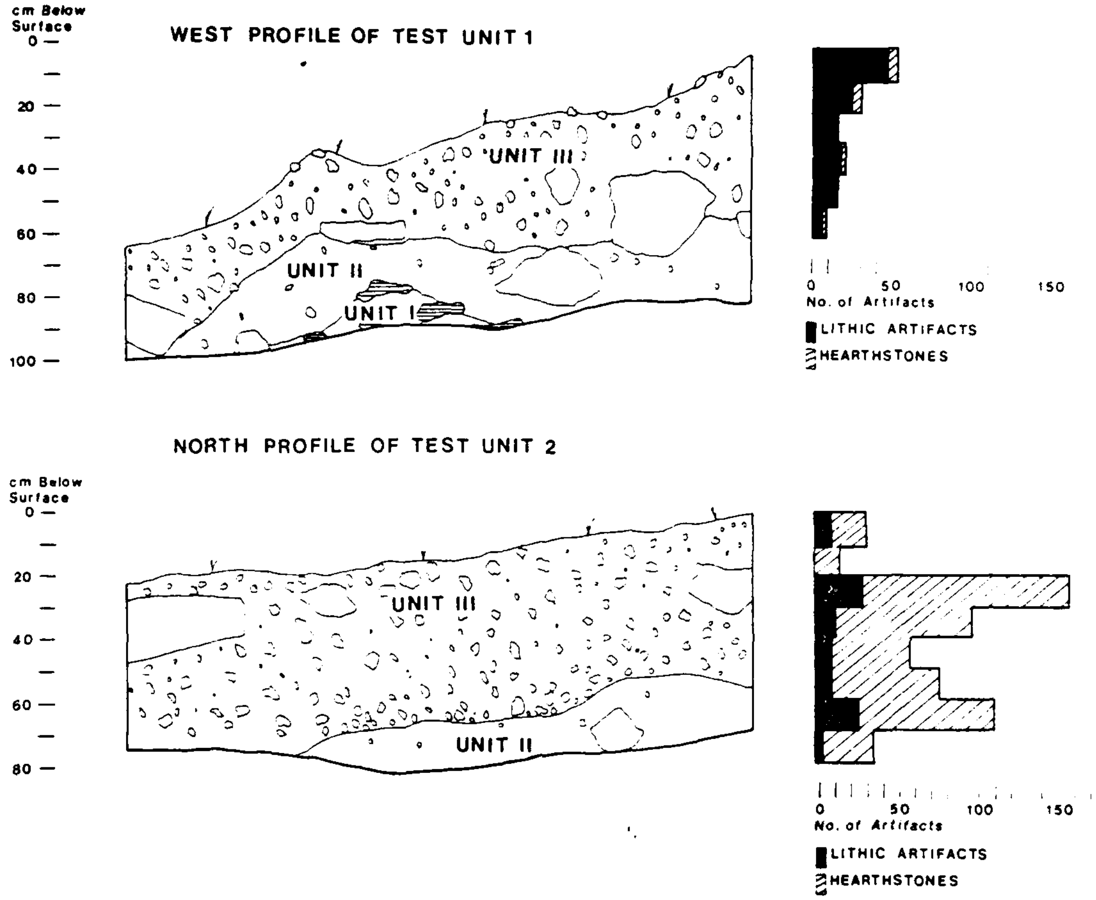


Figure 89. Profiles and distribution of artifacts at Acorn Shelter (23JA182).

Artifact Assemblage

A substantial number of artifacts were recovered from Acorn Shelter. They included fragmentary projectile points, bifaces, edge-modified flakes, mineral and hearthstone. There was also small samples of faunal and floral remains and a large quantity of lithic manufacturing debris. The distribution of these artifacts is shown in Table 29.

Chipped Stone Tools

Chipped stone tools from 23JA182 included projectile points, bifaces, edge-modified flakes and lithic debris. The overwhelming majority of the material is made of Winterset chert with small samples of exotic and Argentine cherts represented.

Table 29. Artifact assemblage recovered from 23JA182, Acorn Shelter.

	EXCAVATION LEVELS 0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	SHOVEL TESTS	TOTAL
CHIPPED STONE TOOLS										
Projectile Points				1					1	2
Bifaces					1		1		3	5
Edge-Modified Flakes	4	1	2	4	5	1	2		1	20
Total	4	1	2	5	6	1	3		5	27
MANUFACTURING DEBRIS										
Cores					1					1
Debitage	55	20	45	26	21	14	23	4		207
Total	55	20	45	26	21	14	23	4		208
HEARTHSTONES	29	22	134	89	53	72	87	33	16	535
MINERAL		2								2
FAUNAL REMAINS				1				1		2
FLORAL REMAINS							1			1
HISTORIC MATERIAL		1	1							2
TOTAL	88	46	182	121	80	87	114	38	21	777

Figure 90. General view of Acorn Shelter showing the heavy vegetation surrounding the site in mid-summer.

Projectile Points (n=2)

Two fragmentary projectile points were recovered, but neither are intact enough to indicate cultural affiliations. One is the distal portion of a narrow dart point of gray Winterset (Fig. 91a) from the 30-40 cm level of Test Unit 1; the other is a basal fragment of a dart point which has been re-utilized as a notched end scraper (Fig. 91b). It appears to have been incomplete at the time of breakage and is made of a dark blue-gray Winterset chert. It was recovered from just below the surface in a shovel test in front of the shelter.

Bifaces (n=5)

Five biface fragments were recovered from Test Unit 2 and from the shovel cuts. One of these is a base section of a long, narrow biface with a very thick cross section, made of gray Winterset chert (Fig. 91c). It is similar to some of the bifaces recovered from the Middle or Late Archaic component at 23JA155, approximately 300 m east of 23JA182. There is also the distal portion of a similar narrow, thick biface from the 40-50 cm level in Test Unit 2 (Fig. 91d). The remainder are fragments of small bifacial blanks (Fig. 91e-f).

Edge-Modified Flakes (n=20)

Edge-modified flakes made up the largest category of tools at the site. There were 20 of these recovered from the testing. Most were small cutting or scraping tools, but one notched and three with utilized projections were also recovered.

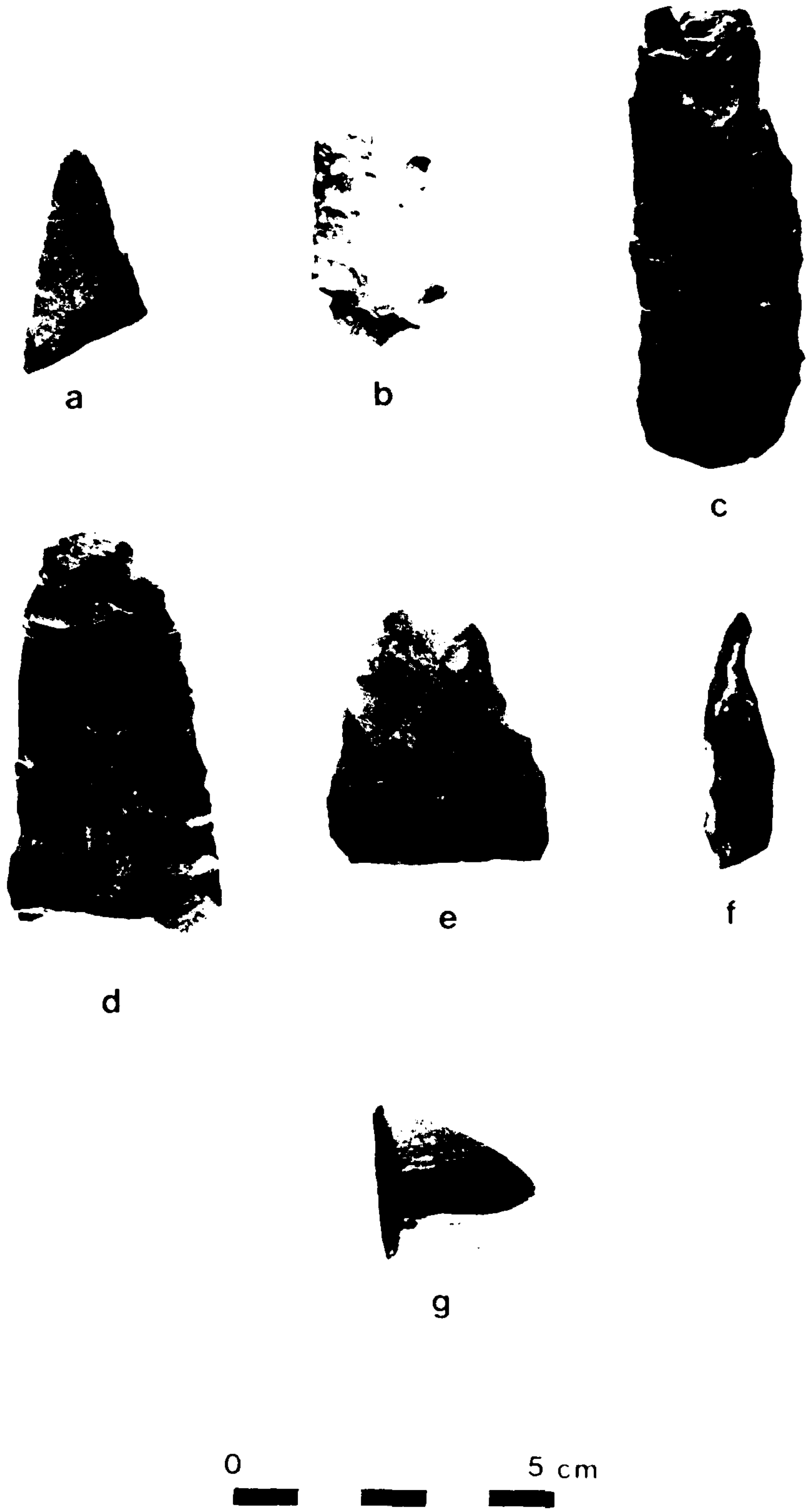


Figure 91. Artifacts recovered from 23JA182: (a-b) projectile points, (c-f) bifaces, (g) worked hematite.

Manufacturing Debris (n=208)

One core of Argentine chert was recovered from the 40-50 cm level in Test Unit 1. It is roughly bifacial and appears to have been struck from a weathered nodule or cobble. The rest of the manufacturing debris was made up of lithic debitage, 99 percent of which was gray Winterset chert. The non-Winterset material consisted of one flake of exotic material and two of Argentine. There were five flakes of reddened Winterset in the sample.

Other Lithic Tools

Hearthstones (n=535)

A large number of small limestone cobbles with a pink or red color were recovered from throughout the deposit. These may be evidence of hearths in the shelter but no charcoal or other evidence was found for such features. It is possible that natural iron or other mineral deposits in the soil or the limestone itself are responsible for the color of the cobbles. Examination of this distribution in the profile (Fig. 89) shows a positive correlation with the density of other cultural material. This indicates that they are probably cultural in origin.

Minerals

Hematite (n=2)

Two pieces of hematite were recovered from the 10-20 cm level of Test Unit 1. One of these is a large faceted chunk with a series of fine parallel striations on one surface (Fig. 91g). It appears to have been faceted by use.

Faunal Remains

Unworked Bone (n=2)

Two bones were recovered from the site. Both were vertebra of small mammals and are likely intrusive.

Floral Remains

Charred Nut (n=1)

One charred nut meat of oak (Quercus sp.) was recovered from 60-70 cm below the surface in Test Unit 2. The specimen appears to be immature. The nut of this genus is available from mid to late fall, which may indicate occupation of Acorn Shelter during this season. The possibility of storage and transport of harvested nuts over the winter must be considered when making seasonality inferences based on utilization of most resources, however.

Discussion

While it is not possible to assign a definite cultural affiliation to the occupations at 23JA182, the density and depth of cultural material argues for an intensive utilization of the site over a relatively long period of time.

Similarities of some of the cultural material to that of the Archaic component at 23JA155 suggest that significant Archaic components may be present. Fall occupation is suggested by the presence of charred oak, but recovery of a larger sample of faunal and floral remains is needed before such inferences are justified. The site has great potential for answering questions of settlement and subsistence patterning of the area. It is also significant in that it is one of a small number of rockshelters in the area and is important in determining the pattern of utilization of these features.

Recommendations

The site is one of only three rockshelters in the Little Blue project area and is important to the study of prehistoric settlement pattern. The cultural affiliation is unknown, but there are similarities to artifacts from a Middle Archaic context at 23JA155 a short distance away. Dense cultural deposits were recorded from the area immediately in front of the shelter, and both faunal and floral remains were recovered from the deposits although the faunal may be intrusive rodent. The site is an important archaeological manifestation and shows promise of providing valuable information about prehistoric settlement and subsistence strategies and chronology of the Little Blue River drainage. Acorn Shelter is a significant site.

The recommended mitigation option is preservation, if this is possible. The site is above the flood pool elevation of the proposed Blue Springs Lake, and the only facility indicated on the development plan map is a trail which will pass within 50 m of the site. This trail should be aligned so that the rockshelter would not be visible from it. In this way the site will not be exposed to excessive visitation and danger from pothunters and vandals. The site could be preserved with a minimum expenditure of effort and be kept available for future investigations. If this is not possible excavations oriented towards the recovery of chronologic data and subsistence information should be undertaken at Acorn Shelter.

23JA183

Site 23JA183 is a small surface shelter located in Blue Springs Corps Tract 117. Its elevation is 780 ft (238 m). The site is located on the T-1 terrace on the east side of the East Fork of the Little Blue River directly across the river from 23JA38, a Woodland occupation. The site area has been cultivated in the past but has grown up in weeks at the time of the testing. The site consists of a light lithic scatter on the edge of the T-1 terrace. The present flood plain of the river is a few meters lower and delineates the west side of the site while an old meander scar marks the east side.

Description of Investigations

The surface collection from the 1976 work consists of eight flakes of Winterset chert (Brown 1977:51), and the surface reconnaissance in 1979 recovered six pieces of Winterset debitage and two edge-modified flakes. The cultural material was all in an area approximately 15 by 20 m.

Two one by two m test units were excavated in the area of the debitage scatter but no cultural material was recovered below the surface. Two backhoe trenches were excavated in the site to test for deeply buried deposits and to examine soil stratigraphy (Fig. 92). The soil in the area of the flake scatter was a black alluvial clay (Unit II) which extended to a depth of 2.1 m at the bottom of Backhoe Trench 1. In the trench which crossed the old meander scar (Backhoe Trench 2) the alluvial soil was approximately one m thick and was underlain by a tan clay (Unit I) which dipped down sharply as it reached the channel scar. This trench began filling with water rapidly and did not inspire enough confidence for a more detailed examination.

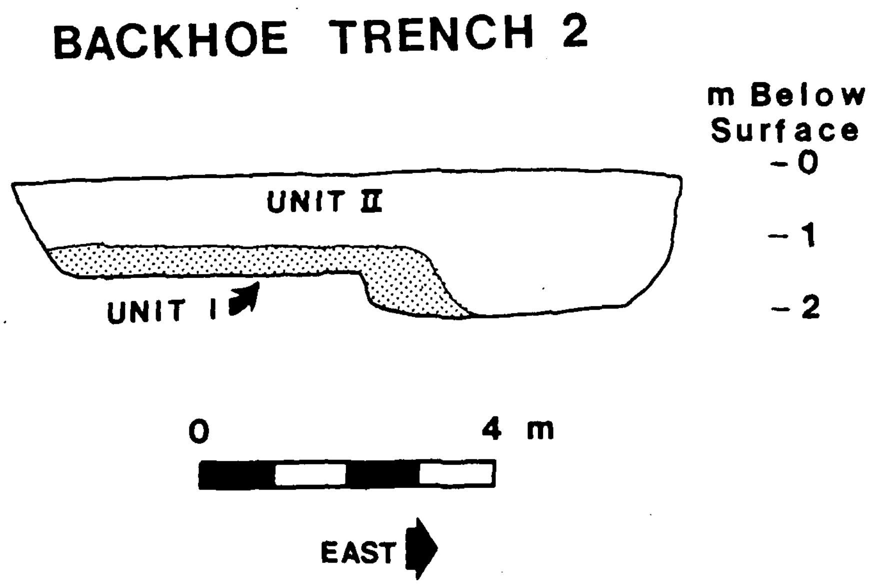


Figure 92. Profile of Backhoe Trench 2 at 23JA183.

No features, diagnostic artifacts, ceramics, faunal or floral remains or datable carbon were recovered from the site.

Artifact Assemblage

The artifacts from 23JA183 consisted of edge-modified flakes, lithic debris and hearthstones. All were recovered from the surface (Table 30).

Chipped Stone Tools

Edge-Modified Flakes (n=2)
Two edge-modified flakes of Winterset chert were recovered. Both have small straight working edges with step fractures wear. One is very small and is probably a piece of the edge of a larger tool.

Table 30. Artifact assemblage recovered from 23JA183.

	SURFACE
CHIPPED STONE TOOLS	
Edge-Modified Flakes	2
MANUFACTURING DEBRIS	
Debitage	6
HEARTHSTONE	2
TOTAL	10

Lithic Manufacturing Debris (n=6)
Five of the flakes were Winterset chert. The sixth was a pink exotic chert. All were tertiary reduction stage materials.

Other Lithic Artifacts

Hearthstone (n=2)
Two reddened limestone cobbles were recovered on the surface. They may be evidence of eroded hearths but the coloration could also be due to soil factors or conditions in the limestone.

Discussion

On the sample of the extremely small size of the site and its artifact assemblage, it is interpreted as a small activity area. The small sample size and generalized nature of the tools renders further interpretation unreliable. The proximity of the site to the Bowlin Bridge site implies a possible relationship, but it is not possible to make any cultural assignment.

Recommendations

This site appears to be small and confined to the surface of the T-1 terrace. A total of 16 artifacts have been recovered from the site in two seasons of fieldwork. No cultural material was recovered below the plow zone. The small amount of material and the surfacial nature of the site make it unlikely that further work would be productive. The site is not significant and no further work is recommended.

23JA184

23JA184 is located in Blue Springs Corps Tract 100. It is located on a knoll at the head of a tributary approximately 1.5 km west of the East Fork of the Little Blue River at an elevation of 850-900 ft (259-274 m). The knoll is in pasture and does not appear to have been cultivated in the recent past. There are low outcroppings of limestone on the lower part of the knoll and unworked Winterset chert chunks and cobbles are scattered on the surface around these outcroppings. Eroded areas on the hillside also exhibit scatters of Winterset chunks and cobbles. The surface exposure of chert covers an area of at least 38,700 sq m (Fig. 93). In 1976 Brown (1977:16) recovered six flakes and four unifaces from the surface of the knoll.

Description of Investigations

No definitely worked material was recovered from the surface in 1979, but there are numerous chunks and cobbles of Winterset chert which may represent initial stage reduction activities on the surface of the site. Two one by one m test units were excavated on the slope of the knoll and on a level area to the east to test for possible buried deposits. No cultural material was recovered from these units but a large number of unworked fragments of Winterset chert came from the upper 20 cm below the surface. The soil on the slope is very dense, reddish brown clay with poorly sorted pebbles and cobbles of angular chert and limestone (Unit I). On the level area below the slope there is approximately 20 cm of dark brown clay loam (Unit II) over this reddish brown clay (Unit I). The clay in this unit contained few chert pieces but did have a number of limestone pebbles and cobbles in it. It appears that the chert is weathering out of the slope.

Discussion

The site appears to be a lithic procurement area where cobbles and chunks of Winterset chert were readily available. There is no evidence of intensive quarrying activity, but rather a pattern of opportunistic utilization of easily obtainable material. Further work at the site is unlikely to yield significant new data.

Recommendations

The site appears to be an area of Winterset chert outcropping which has been utilized by prehistoric peoples as a source of chert for flintknapping. There were no features or subsurface deposits noted, however, and it is not likely that any further archaeological investigations would recover significant data. The amount of identifiable culturally modified material is quite low. The site is not significant and no further work is recommended.

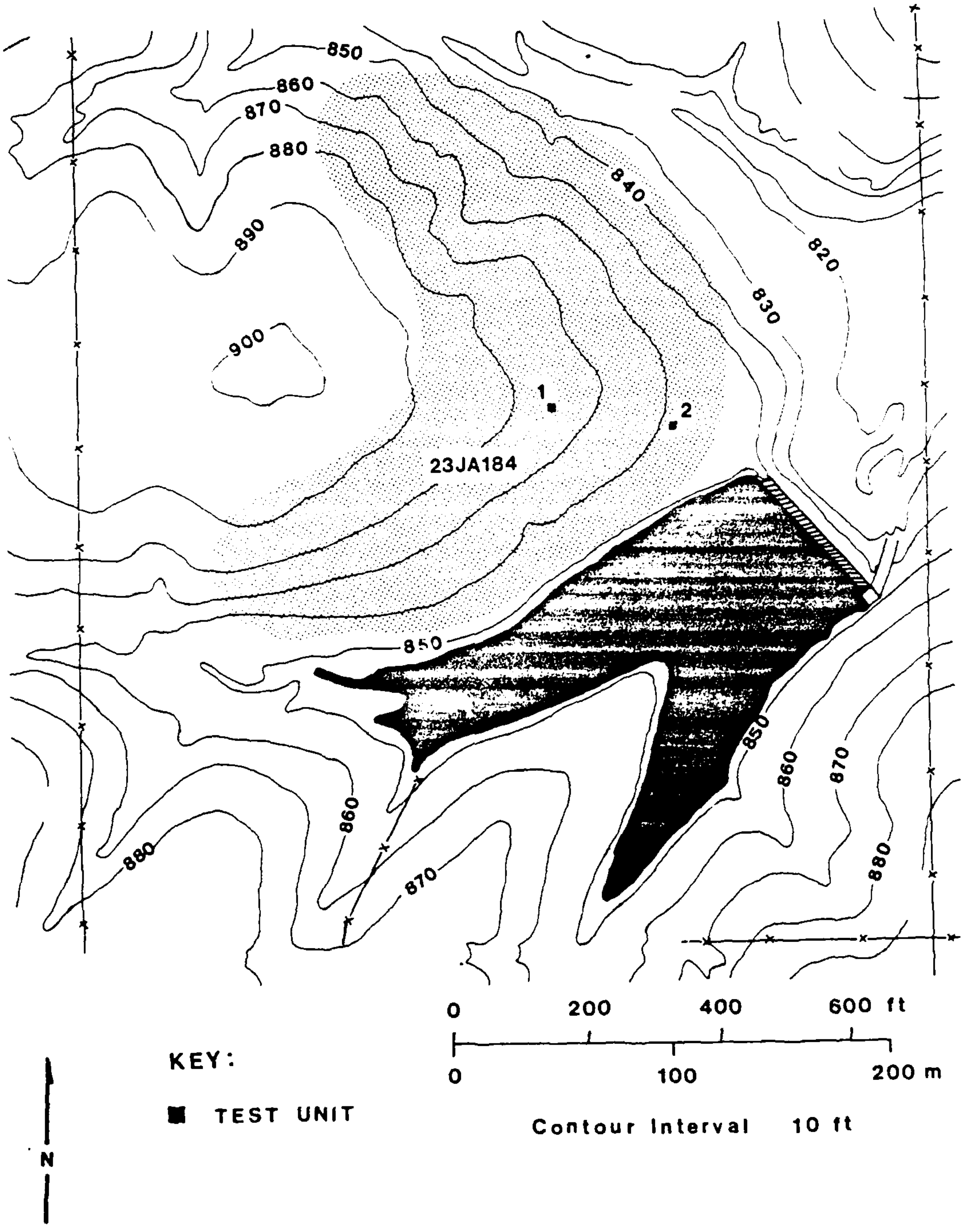


Figure 93. Location of 23JA184.

CHAPTER VIII

PHASE II TEST EXCAVATIONS AT THE COLD CLAY SITE (23JA155)

Larry J. Schmits and Thomas P. Reust

INTRODUCTION

Cold Clay is located near the headwaters of the East Fork of the Little Blue River (Fig. 94). The site was first located and tested by the University of Kansas in a 1976 cultural resources survey of the proposed Blue Springs Lake for the U.S. Army Corps of Engineers (Brown 1977). These test excavations identified cultural material to a depth of 80 cm below the surface. The only diagnostic artifact recovered was a Late Archaic-Middle Woodland contracting stemmed point.

Since the 1976 test excavations were inconclusive, further testing of the site was recommended; quick action was necessary as 23JA155 was located in the right-of-way of the Blue Springs Interceptor Sewerline and site destruction was imminent. These investigations were conducted during the summer of 1979 by Soil Systems, Inc. as part of a contract with the U.S. Army Corps of Engineers for mitigation of impact to the archaeological resources of Blue Springs and Longview Lakes. These investigations resulted in the discovery of a deeply buried, potentially significant component at the site. Phase II archaeological testing of the buried components was conducted in December, 1979 as a result of a change order in the contract, allowing for testing of sites 23JA155 and 23JA238 in lieu of data recovery investigations at 23JA109. 23JA109 had been destroyed by pipeline construction prior to the initiation of field work on the Little Blue Lakes Project.

DESCRIPTION OF THE EXCAVATIONS

The initial 1979 investigations involved shovel cuts dispersed over the terrace. No cultural material was recovered from these units. A reexamination of the collection recovered from the 1979 excavation indicates that most of the material collected was natural chert debris probably colluvially redeposited from up the bluff slope. Despite these initial negative results, the site was of considerable interest due to the presence of the older terrace fill. One objective of the archaeological mitigation program for Blue Springs and Longview Lakes has been the investigation of the alluvial sequence of the Little Blue River in order to obtain temporal and paleoenvironmental information related to prehistoric settlement-subsistence patterns and the distribution of sites in the valley.

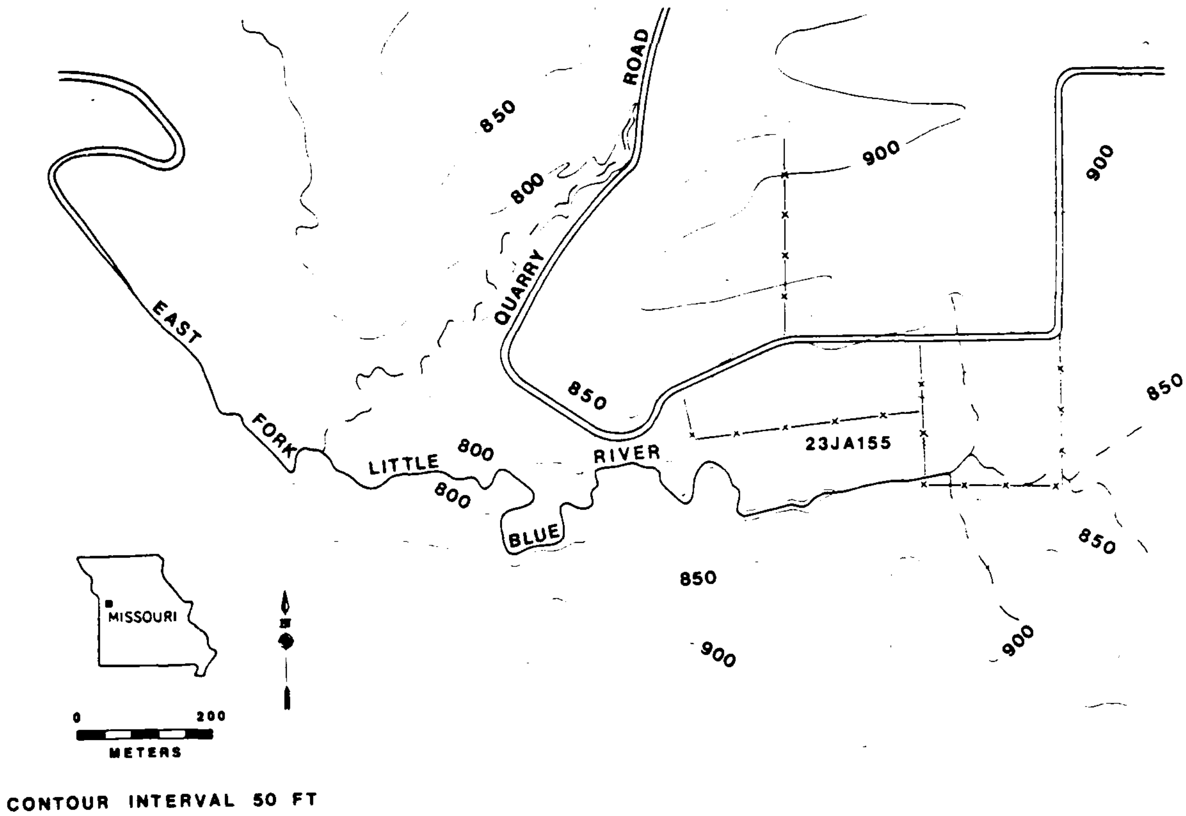


Figure 94. Location of 23JA155 and surrounding area.

In order to investigate the older terrace deposit more thoroughly, a backhoe trench (North Trench) was cut from the bluff face across the terrace at 23JA155 (Fig. 95). The stratigraphy revealed by this trench consisted of an upper deposit (Unit B) overlying a lower depositional unit capped by a buried paleosol (Unit A). As the trenching operations progressed southward, evidence of a buried cultural level approximately two m below the surface was encountered in Unit A.

The testing of the buried component at 23JA155 initially consisted of expanding the west side of the North Trench, permitting the excavation of a two by three meter test block. Due to the deeply buried condition of this component, only limited testing was possible during the summer of 1979. These investigations resulted in the recovery of bifacial and unifacial tools and a large quantity of lithic flaking debris. Based on its position in an older terrace fill and the absence of ceramics, the site appeared to be of considerable antiquity and, as such, potentially significant.

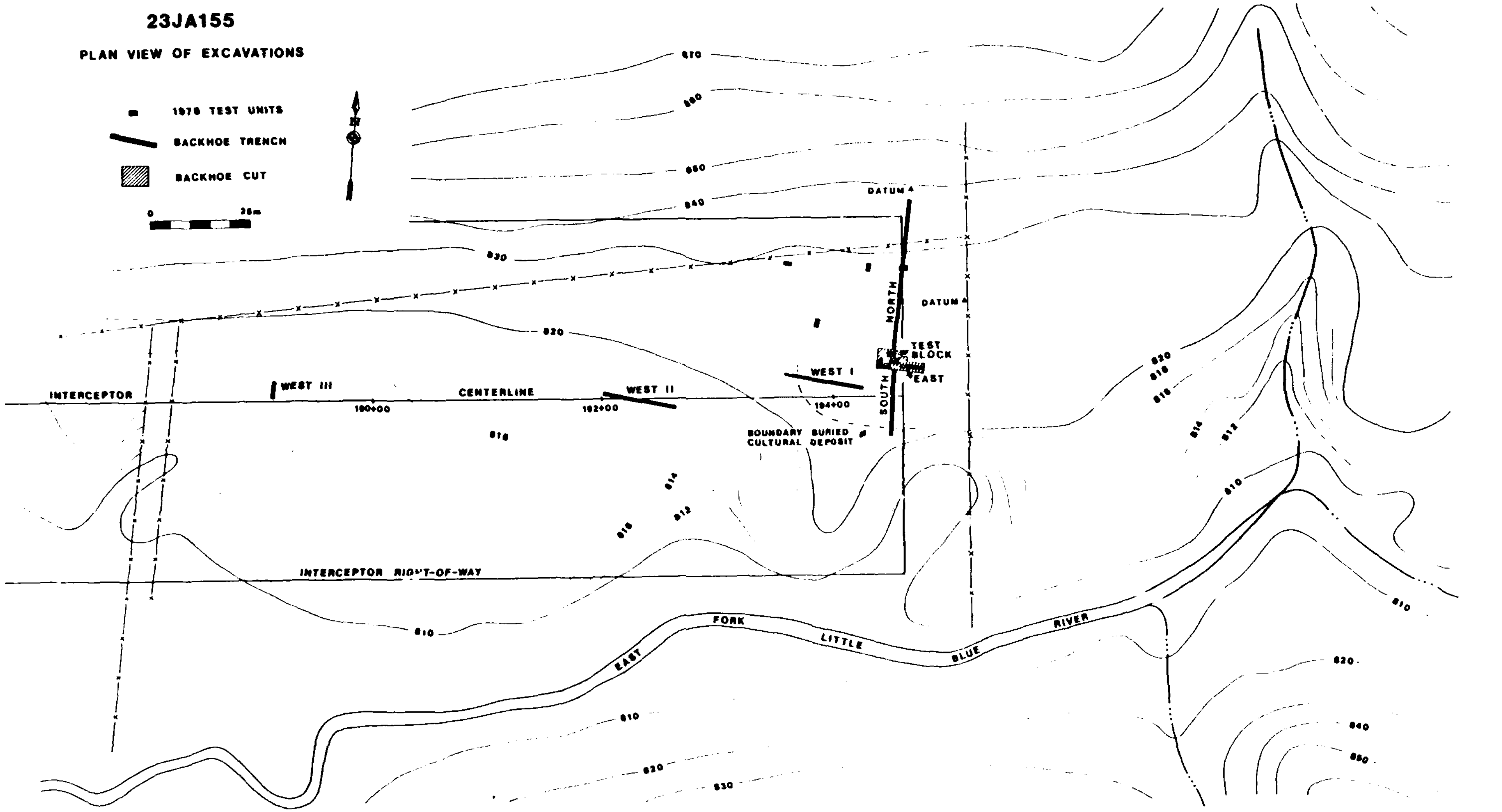


Figure 95. Plan view of the test excavations at 23JA155 showing the location of the buried cultural component.

Archaeological testing of a deeply buried cultural deposit requires a set of specially adapted field methods. Weeks of field work would have been required to hand excavate a sufficient number of test pits to define the limits of the site. This would have been extremely costly and would not have been feasible during the winter, when freezing and thawing would have resulted in dangerous slumping of the walls of test pits. Consequently, the field methods used in the second phase of testing at 23JA155 consisted of backhoe trenching to define the limits of the site, followed by hand excavated test units to recover a sample of diagnostic artifacts and carbon suitable for dating.

Five additional backhoe trenches were cut at 23JA155. The first of these, the South Trench, (Fig. 95) was 18 m long and was cut to determine site limits south of the previous test excavations. The trench was taken to a depth ranging from 3.8-5.0 m below the surface and revealed that the stratigraphic sequence observed in the North Trench extended to the south. The bed of patinated chert terminated a few m south of the test excavations (Fig. 95).

Stratigraphy

The stratigraphy of the terrace fill at Cold Clay consists of two depositional units referred to as Units A and Unit B (Fig. 96). The upper deposit, Unit B, consists of a clayey silt extending from the surface to a depth of approximately 70 cm. This deposit is characterized by a weakly developed soil structure; it probably is fairly recent colluvium from the adjacent hillside. The lower deposit (Unit A) extends from a depth of 70 cm below the surface to at least 7.0 m (the base of the test excavation and backhoe trench). The Unit A sediments consist of dark gray brown and dark gray clayey silts with manganese and ferruginous precipitate stains indicative of fluctuating oxidizing and reducing ground water conditions.

The upper 60 cm of Unit A is apparently a buried palesol indicative of a period of stability; it is marked by increased organic content and a moderately developed subangular blocky structure resulting from soil development. Unit A also contains a coarser bed of patinated limestone and chert pebbles located at 150 cm below the surface. This coarser bed probably resulted from a period of intense erosion and gully washing on the hillside. The buried cultural deposit occurs just below the coarse lens between 1.8 and 2.5 m below the surface. The cultural deposit is a zone of lithic debris, broken tools, small fragments of charcoal and burnt bone.

As a result of the discovery of the buried paleosol the soil profile at the site was examined in detail by C.J. Sorenson, Department of Geography, University of Kansas. The surface soil at 23JA155 is described as belonging to the Bremmer Series, a member of the fine, Montmorillonitic, mesic family of Typic Agriaguolls (U.S. Department of Agriculture 1974). Bremmer Soils typically have black friable silty clay loam A-horizons, very dark gray, dark gray and dark grayish-brown heavy clay loam B2 Horizons that are distinctly mottled, and gray firm silty clay loam C-horizons. Sorenson's observations for the profile along the north wall of the test block are presented in Table 31.

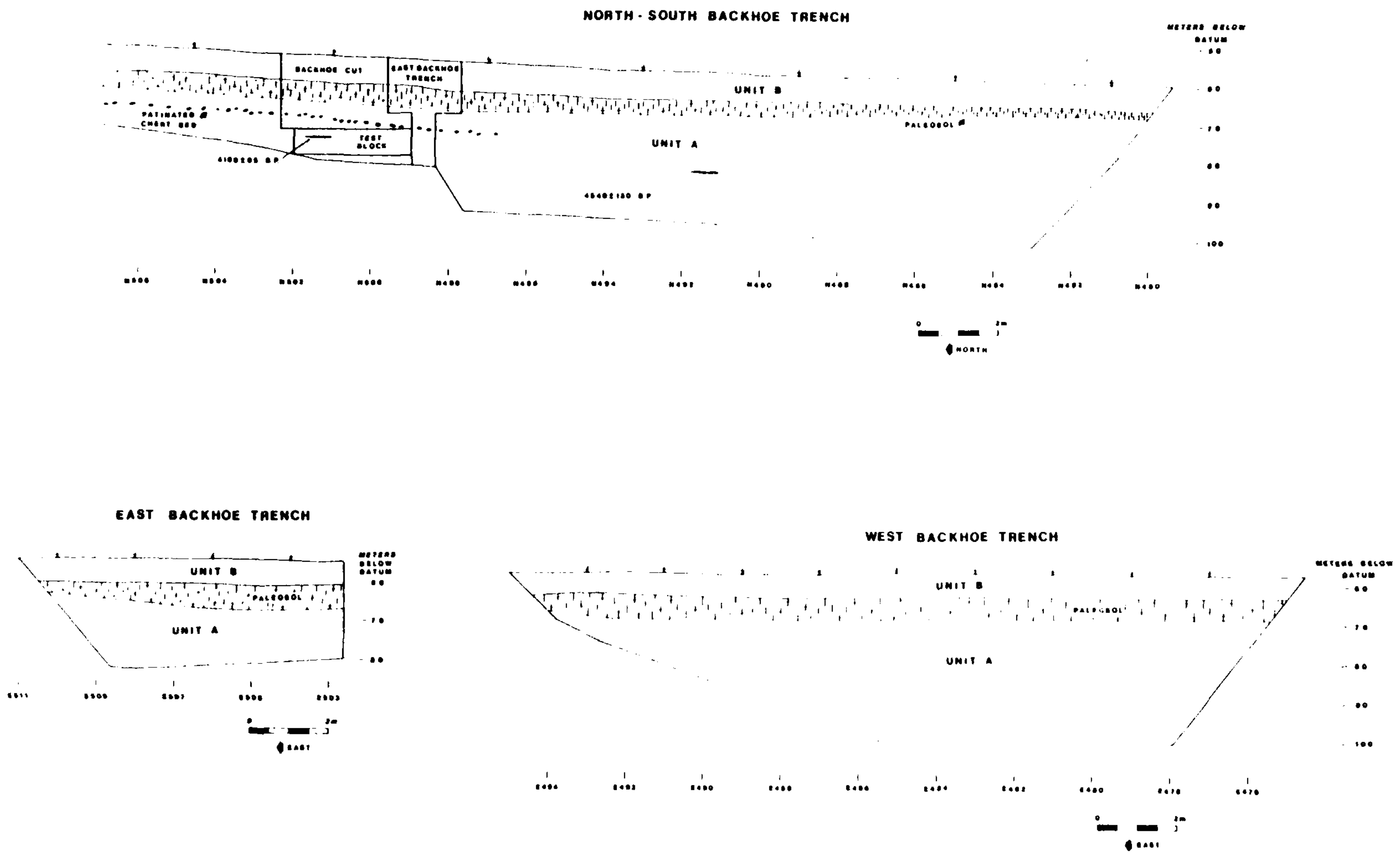


Figure 96. Profile of backhoe trenches at 23JA155.

Table 31. Soil profile description at 23JA155.

SURFACE DEPTH	DEPOSITIONAL UNIT	SOIL HORIZON	MUNSELL COLOR	TEXTURE	STRUCTURE	COMMENTS
0-20	B	Alp	brown-dark brown (10YR 4/3)	silt loam	fine granular	old cultivation zone
20-45	B	A13	brown-dark brown (10YR 4/3)	silt loam	medium granular	
45-55	B	B1	brown-dark brown (10YR 4/3)	silty clay loam	weak subangular	
55-70	B	B2	dark gray (10YR 3/1)	silty clay loam	moderate sub-angular	
70-90	A	IIB21	dark gray (10YR 3/1)	silty clay loam	medium fine sub-angular blocky	strong verticle ped-orientations clay skins well developed
90-130	A	IIB22t	dark gray (10YR 3/1)	silty clay loam	weak fine prismatic to medium angular blocky	
130-155	A	IIB3	mottled gray brown 10YR4/2-very dark gray (10YR3/1)	clay loam	weak coarse angular blocky angular blocky	clay skins pronounced, grades into C-horizon patinated chert bed
155-240	A	IIC1	mottled gray brown (10YR 4/2) - very dark gray(10YR 3/1)	silty clay loam	weak medium angular grades to massive	mottled, Mg stains increase with depth, cray fish cortovinas and buried cultural level present

At 23JA155 the soil profile is very similar to that described for the Bremmer series except that the sharp discontinuity in the soil profile at a depth of approximately 70 cm below the surface is indicative of a buried soil. Physical and chemical data for the soil profile is given in Table 32. A sharp break in pH, $CaCO_3$ in ppm, and clay content all occur at approximately the 70 cm level. The contact at 70 cm and relatively low organic matter content in the IIB_{21} horizon indicates that the paleosol A-horizon has been truncated. Sufficient humic acids remained in the buried B-horizon for radiocarbon dating and a date of 4245±170 B.P. was obtained.

Table 32. Chemical and physical data on sediment samples from 23JA155.

SAMPLE NO.	DEPOSIT. UNIT	SURFACE DEPTH	pH	$CaCO_3$ ppm	PERCENT ORGANIC MATTER	%SAND	GRAIN SIZE %Silt	%Clay
1	B	10 cm	6.6	15	2.6	15.2	61.0	23.8
2	B	35 cm	6.8	15	1.4	16.2	57.2	26.6
3	B	50 cm	6.6	25	1.2	17.0	53.8	29.2
4	B	60 cm	6.7	36	1.2	16.6	51.6	31.8
5	A	80 cm	6.3	70	1.0	15.4	48.8	36.2
6	A	100 cm	6.2	80	0.9	16.8	47.4	35.8
7	A	120 cm	6.3	65	0.8	15.4	49.0	35.6
8	A	140 cm	6.3	59	0.9	22.8	44.6	32.6
9	A	160 cm	6.4	55	0.6	22.6	44.8	32.6
10	A	180 cm	6.6	50	0.4	19.4	47.0	33.6
11	A	200 cm	6.5	50	0.6	16.8	50.0	33.2
12	A	140 cm	6.6	54	0.5	19.4	45.6	35.0

Data from other localities in the East Fork of the Little Blue Basin indicate that deposition of the T-1 terrace was occurring at 8,060±97 B.P. and continued through the period of cultural occupation in Unit B at Cold Clay. The truncated paleosol indicates a period of stability followed by an erosional event of some magnitude, probably basin-wide. A lower gravel bed in

Unit A is evidence of an earlier erosional event of sufficient scope to result in deposition of these coarse grained deposits.

The stratigraphic record and radiocarbon dates from Cold Clay indicate a period of extensive alluviation resulting in the deposition of Unit A. This period of sedimentation was initiated at some time prior to 4540±140 B.P. The lack of soil development in the lower Unit A profile suggests that this deposition was rapid and stabilized at some point about 4245±170 B.P.

The lack of preserved building structures, the fine grain size of the sediments, and the crayfish burrows indicate that sedimentation of Unit A occurred in an overbank flood plain environment. The site at the time of the Archaic occupation probably consisted of a moist, open depression in the flood plain which was seasonally inundated by flooding. The mottled gray and brown color of the sediments is indicative of frequent ground water fluctuations.

The period of stability following the deposition of Unit A was terminated by the erosional event truncating the paleosol and renewed deposition of Unit B. Based on the contracting stemmed point recovered from Unit B, this period of deposition probably occurred during very late Archaic or Middle Woodland (ca. 1550-3000 B.P.) times. The composition and structure of Unit B indicate that it probably resulted from colluviation from the adjacent hillside.

Radiocarbon Dates

Three radiocarbon dates are available from 23JA155 (Table 33). Two dates (DIC-1678 and DIC-1679) are based on charcoal recovered from the cultural level in the Unit A IIC1 soil horizon. The third date is based on organic humic acids recovered from a bulk sediment sample taken from the IIB22t soil horizon in the paleosol near the top of Unit A. A previous sample of charcoal from the cultural level submitted to Dicarb Radioisotope Co. dissolved in a 2N NaOH base used for humic acid pretreatment. Since the two remaining charcoal samples were small, a decision was made to delete further humic acid pretreatment. Small amounts of the samples were treated with the base to check for humic acid discoloration. Almost no humic acid discoloration appeared and humic contamination does not appear to be a problem affecting the accuracy of these two dates.

Table 33. Radiocarbon dates from Unit A at 23JA155.

LAB NO.	SOIL HORIZON	DATUM DEPTH	DATE B.P.	DATE B.C.
DIC-1678	IIC1	8.22	4540±150	2590
DIC-1679	IIC1	7.40-7.50	4180±95	2230
Beta-1325	IIB22t	6.26-6.33	4245±170	2295

The three dates from the site span a remarkably brief interval of 360 years. When the standard deviations are considered this interval is extended to 605 years. The samples have a datum depth range which span a 80-196 cm interval from 6.26-8.22 meters. The two dates from the cultural level are stratigraphically consistent. The earlier date is 82 cm lower than the more recent date. However, the strata at the site dip gently to the south, and it is likely that both charcoal samples were deposited during a single cultural occupation which spanned a fairly brief interval. The mean of 4360 B.P. for the two radiocarbon dates is probably the best estimate of this occupation.

What was unexpected, however, is the relatively brief interval between the dates from the cultural level and the humic acid date from the IIB22t horizon in the paleosol at the top Unit A. The date recovered from the paleosol of 4245±170 B.P. in only 115 years more recent than the mean date from the cultural level. The upper date on the cultural level is actually more recent than the date on the soil horizon. However, the standard deviations of the two dates overlap considerably. When the standard deviation of the humic acid date is considered, plus the fact that the date is based on humic acids rather than charcoal, the radiocarbon chronology for the site appears to be acceptable.

THE ARTIFACT ASSEMBLAGE

The artifact assemblage recovered from the test units and the backhoe trenches at 23JA155 includes 4790 chipped stone tools, pieces of lithic manufacturing debris, groundstone tools, minerals, fragments of unworked animal bone and unworked stone. Artifact tabulations and their distribution at the site are presented in Table 34.

Chipped Stone Tools

The chipped stone tools are almost entirely blue gray Winterset chert available from Winterset limestone outcrops on the valley wall, just a short distance north of the site. However, the biface sample includes several exotic cherts not locally available in the Kansas City area.

Bifacial Tools

Bifacial tools from 23JA155 include projectile points, bifacial knives, biface blanks, and biface fragments. Descriptive data for the bifacial tools are presented in Table 35.

Projectile Points (n=3)

Three projectile points were recovered from the test excavation. One (Fig. 97a) is a base of a lanceolate point made from heated non-local chert. The point has a large diagonal impact fracture located just above the haft element. The point has a straight base and ground lateral margin near the base and is thick in cross-section. However, the cross-section is lenticular rather than biconvex as is typical of Nebo Hill points commonly found in the area.

Table 34. Artifact assemblage recovered from 23JA155.

	TEST EXCAVATIONS (METERS BELOW DATUM)															BACKHOE TRENCHES				
	6.6 - 6.7	6.7 - 6.8	6.8 - 6.9	6.9 - 7.0	7.0 - 7.1	7.1 - 7.2	7.2 - 7.3	7.3 - 7.4	7.4 - 7.5	7.5 - 7.6	7.6 - 7.7	7.7 - 7.8	7.8 - 7.9	7.9 - 8.0	8.0 - 8.1	North	South	East	West I	SITE TOTAL
CHIPPED STONE TOOLS																				
Projectile Points										1			1					1		3
Bifacial Knives								1		1	1	3		1		1	2			10
Bifacial Blanks								1			3	1						1		6
Biface Fragments							3		3	1			4							11
Scrapers												1								1
Edge-Modified Flakes				1	2	2	10	15	18	18	10	10	5	1		5				97
Total				1	2	2	13	17	21	21	14	15	10	2		6	2	2		128
MANUFACTURING DEBRIS																				
Cores								2	1	6	3	1	2	1		2		2		20
Tabloids																		1	1	
Chunks		2	3	1	3	11	7	9	18	20	16	20	11	5		2	1	8		137
Shatter			6		1	3	6	34	29	24	33	11	12							159
Flakes																				
Primary	1		1	2	1	3	3	8	6	11	3	6	7	2		1		1	1	57
Secondary		2	1	4	1	5	8	15	22	13	11	7	8	3	2	4		7		113
Tertiary	1	1	5	7	8	19	43	79	75	101	93	54	58	7	2	15	4	31	2	605
Chips (2cm)	5	9	5	5	15	20	51	150	116	144	180	90	66	9	4	20	3	7	2	901
Hammerstones									1								1			2
Total	7	14	21	19	29	61	118	297	268	319	339	189	164	27	8	44	9	57	6	1996
UNWORKED BONE					1	4	2	20	41	39	65	33	41	15	10		16	10		297
MINERALS																				
Hematite							2	3	27	2	9	7	6				2			58
Limonite								4	1	3	3									11
Ochre										1	1	1	1			1		1		6
Total							2	7	28	6	13	8	7			1	2	1		75

Table 34 continued. Artifact assemblage recovered from 23JA155.

	TEST EXCAVATION (METERS BELOW DATUM)															BACKHOE TRENCHES				
	6.6 - 6.7	6.7 - 6.8	6.8 - 6.9	6.9 - 7.0	7.0 - 7.1	7.1 - 7.2	7.2 - 7.3	7.3 - 7.4	7.4 - 7.5	7.5 - 7.6	7.6 - 7.7	7.7 - 7.8	7.8 - 8.9	7.9 - 8.0	8.0 - 8.1	North	South	East	WestI	SITE TOTAL
GROUNDSTONE TOOLS																				
Mano														1						1
Abrader						1														1
Ground Stone Fragments											1									1
Total						1					1			1						3
UNWORKED STONE	55	74	171	144	124	169	223	185	243	162	168	203	169	72	83	21	1	11	13	2291
TOTAL																				4790

Table 35. Descriptive data for bifacial tools from 23JA155.

CATALOG NUMBER	TOOL TYPE	PROVENIENCE	DATUM DEPTH	RAW MATERIAL	HEAT DIS-COLORATION	WEIGHT (g)	DIMENSIONS (mm) Length	Width	Thickness
644	Proj.Pt.	E503N499	7.86	non-local		7.1	39	30	8
664	Proj.Pt.	E503N500	7.56	non-local	+	-	-	25	10
755	Proj.Pt.	East Trench	7.92	non-local	+	-	-	25	10
195	Biface Knife	Backhoe Trench	7.84	Winterset	+	-	56	-	10
306	Biface Knife	E501N501	7.79	Winterset		28.3	66	41	9
357	Biface Knife	E501N499	7.30	Winterset	+	-	-	-	9
467	Biface Knife	E501N500	7.75	Winterset		-	-	47	14
526	Biface Knife	E502N499	7.70	Winterset				45	17
663	Biface Knife	E503N500	7.52	Winterset		21.1	68	28	10
736	Biface Knife	South Trench	7.14	Winterset	+	-	-	28	12
743	Biface Knife	South Trench	-	Winterset		34.6	55	47	16
752	Biface Knife	E501N499	7.93	Winterset		-	-	-	12
753	Biface Knife	E500N499	7.61	Winterset		-	-	29	14
96	Biface Blank	E501N498	7.60-7.70	Winterset		-	-	38	8
337	Biface Blank	E500N498	7.78	Winterset	+	-	-	27	13
431	Biface Blank	E499N498	7.62	Winterset		20.2	67	32	10
441	Biface Blank	E499N498	7.82	Winterset		36.6	64	38	18
648	Biface Blank	E503N500	7.32	Winterset		49.1	58	52	15
747	Biface Blank	East Trench	7.63	Winterset		-	54	-	10
11	Biface Frag.	E499N498	7.30-7.40	Winterset		-	-	-	9
30	Biface Frag.	E499N499	7.24	Winterset	+	-	-	-	12
111	Biface Frag.	E501N498	7.80-7.90	Winterset		-	-	-	9
249	Biface Frag.	E501N501	7.25-7.35	Winterset		-	-	-	14
278	Biface Frag.	E501N501	7.46	Winterset		-	-	-	7
341	Biface Frag.	E500N498	7.85	Winterset		-	-	-	11
376	Biface Frag.	E501N499	7.44	Winterset		-	-	-	16

(continued)

Table 35. continued Descriptive data for bifacial tools from 23JA155.

CATALOG NUMBER	TOOL TYPE	PROVENIENCE	DATUM DEPTH	RAW MATERIAL	HEAT DIS-COLORATION	WEIGHT (g)	DIMENSIONS (mm) Length	Width	Thickness
432	Biface Frag.	E499N498	7.70	Winterset		-	-	-	11
442	Biface Frag.	E499N498	7.80	Winterset	+	-	-	-	12
482	Biface Frag.	E500N499	7.25	Winterset		-	-	-	7
538	Biface Frag.	E502N499	7.84	Winterset		-	-	-	9
625	Biface Frag.	E503N499	7.50-7.60	Winterset	+	-	-	-	10
635	Biface Frag.	E503N501	7.47	Winterset		-	-	-	12

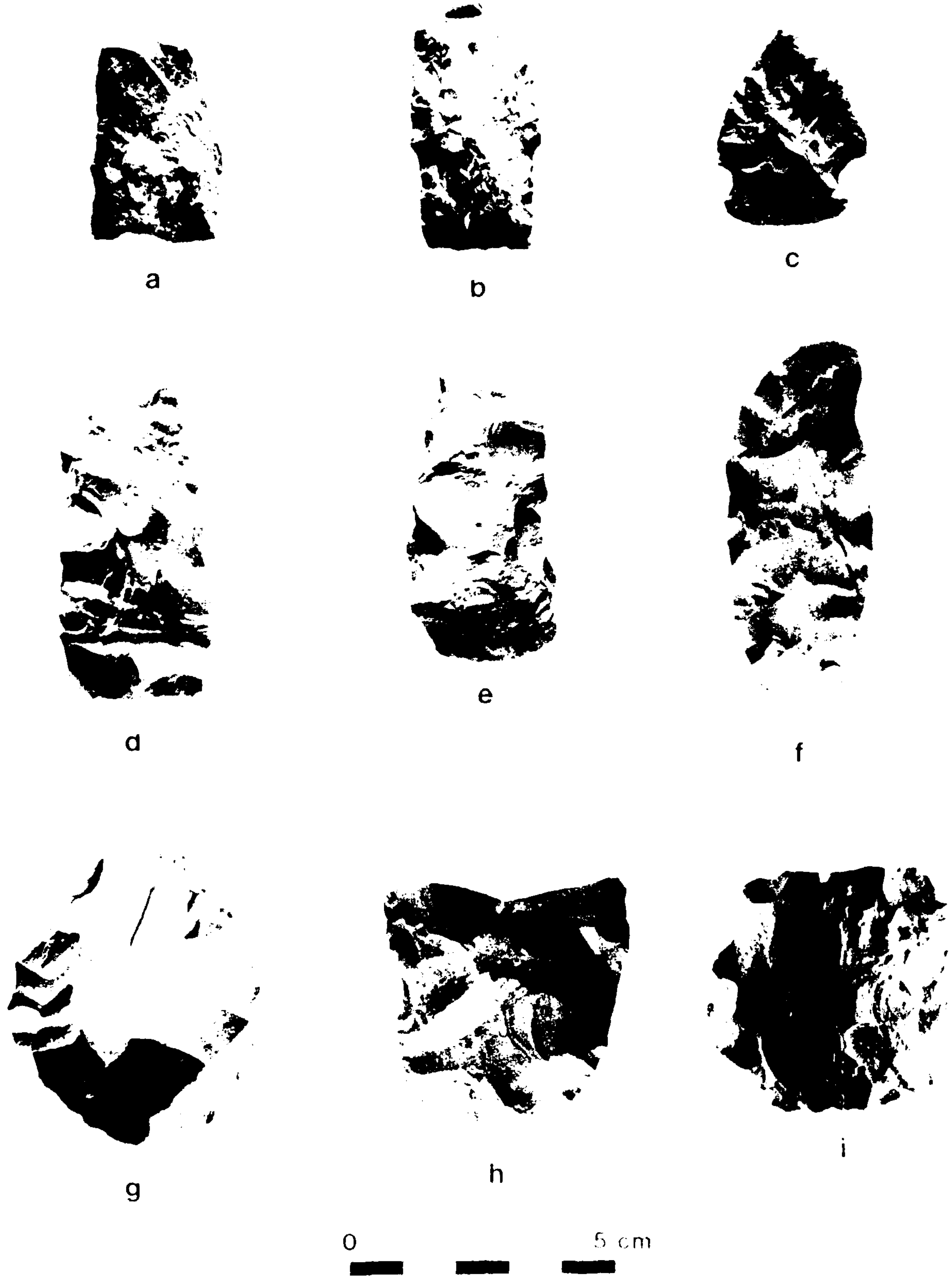


Figure 97. Bifacial tools from 23JA155: (a-c) projectile points, (d-f) lanceolate knives, (g-i) ovate knives.

A second point (Fig. 97b) is a stemmed point with a square stem. This point is also made from non-local heated chert and has a transverse impact fracture near the tip. The third point is a triangular corner-notched specimen made from a non-local light gray chert (Fig. 97).

Bifacial Knives (n=10)
Ten bifacial knives, all made of blue gray Winterset chert, were recovered. Three are lanceolate, five are ovate, one is elongate, and one is the distal section of a large bifacial knife. Two of the lanceolate specimens are thick in cross section with sinuous lateral edges (Fig. 97d-e). Both of these show patterned primary flaking and unidirectional marginal retouch. One of these two specimens (Fig. 97d) has been heat treated and exhibits numerous step fractures. The third lanceolate knife (Fig. 97f) is lenticular in cross section and has irregular primary flaking. The lateral edges exhibit unidirectional marginal retouch as well as intermittent attrition wear.

Three knives are broad ovate in shape. All exhibit patterned primary flaking. A complete specimen (Fig. 97g) has areas of unidirectional marginal retouch and numerous step fractures on both lateral edges. A second specimen (Fig. 97h) with bidirectional marginal retouch and intermittent attrition has a large transverse hinge fracture. The third broad ovate biface shows unidirectional marginal retouch (Fig. 97i). Two convex based ovate knives with thin cross-sections are present. One of these specimens (Fig. 98a) has irregular primary flaking. Cortex as well as several remnant platforms are present on one face. The other surface shows a high degree of marginal retouch. The second convex based ovate biface (Fig. 98b) has two lateral fractures. Heat treatment is evidenced as well as unidirectional marginal retouch.

Two additional bifacial knife fragments are represented. One is the basal section of a large, elongate biface. Patterned primary flaking and unidirectional marginal retouch is present. The other fragment is the distal end of a large, well worked biface. Heat treatment as well as a high degree of bidirectional marginal retouch is present.

Bifacial Preforms and Blanks (n=6)
One preform notched on one side (Fig. 98c) appears to have been an incompletely finished stemmed projectile point. Patterned primary flaking as well as basal thinning is present. The other five blanks exhibit irregular primary flaking and a lack of edge wear (Fig. 98d-e). They were probably early discards in the lithic reduction sequence.

Biface Fragments (n=13)
Thirteen bifacial artifacts are small fragments. These tools are probably sections of bifacial blanks or knives. Three evidence heat treatment.

Unifacial Tools and Edge-Modified Flake Tools

These artifacts include 98 tools made from unifacial flake or blade blanks whose shape or edges have been modified by retouch or use.

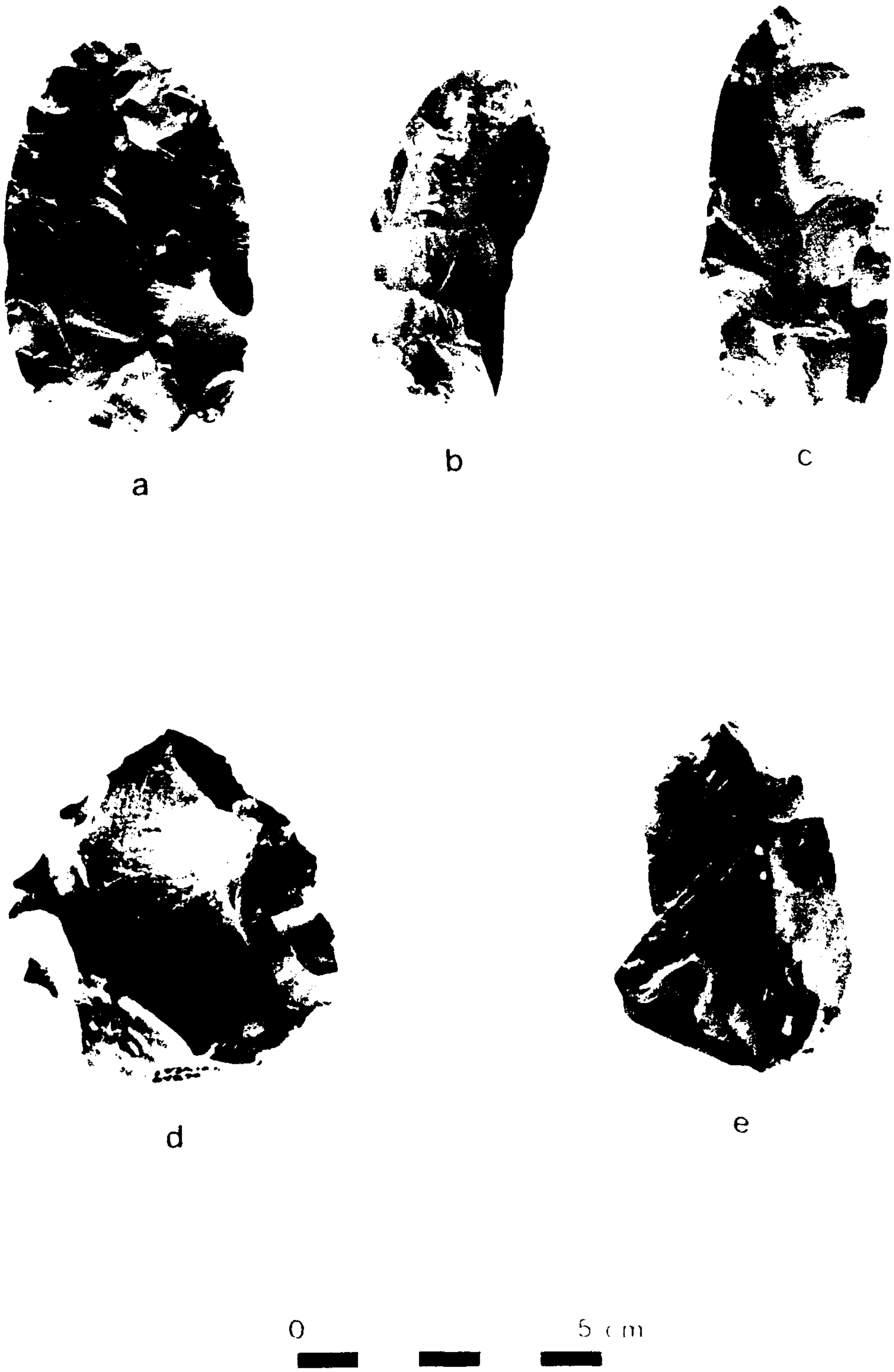


Figure 98. Bifacial tools from 23JA155: (a-b) ovate bifacial knives, (c) projectile point preform, (d-e) bifacial blanks.

Scrapers (n=1)

One Winterset plano-convex end scraper (Fig. 99a) has a convex transverse working edge and steeply retouched lateral margins. Dimensions of the scrapers are length 37 mm, width 25 mm and thickness 8 mm.

Edge-Modified Flakes (n=97)

These tools have used modified or marginally retouched edges (Fig. 89b-c). Descriptive data for the sample is summarized in Table 36. All of the utilized flakes are of Winterset chert. Eleven show deliberate marginal retouch. Seventy-five (77.3 percent) of the edge-modified flakes have a convex or a straight margin of retouch. Forty-three with convex or straight edges show attritional wear indicative of cutting use. Forty-one evidence step fractures resulting from scraping use.

Twenty-five (25.8 percent) of the utilized flakes have a concave margin of retouch. Nineteeen of these show step flaking wear, and six show attrition. The utilized flakes with concave edges probably served as spokeshaves used to work convex surfaces such as wood or bone shafts. Six flakes (6 percent) have projections suitable for perforating or engraving.

Lithic Manufacturing Debris

The lithic manufacturing debris from 23JA155 consists of cores, tabloids, chunks, shatter, debitage, and chips. Two hammerstones used for tool manufacture were also recovered.

Cores (n=20)

Twenty Winterset chert cobbles and pebbles recovered from the test excavations and backhoe trenches have striking platforms and flake removal surfaces. Descriptive data for the cores is summarized in Table 77. The majority are irregular pieces exhibiting nonpatterned flake scars and striking platforms (Fig. 100a-b). Reduction of the cores have been heated.

Tabloids (n=2)

Two large pieces or raw material suitable for lithic reduction lack evidence of flaking (Fig. 100c). Both tabloids are Winterset chert.

Chunks (n=137)

Irregular shaped pieces of raw material with a maximum dimension of greater than three cm and lacking recognizable striking platforms and flake removal surfaces have been classified as chunks. All chunks from 23JA155 are Winterset chert.

Shatter (n=159)

Irregular pieces of chipping debris with a maximum dimension of less than 3 cm have been classified as shatter. All shatter from 23JA155 appears to be Winterset chert.

Debitage (n=775)

Debitage consists of unutilized flakes or flake fragments with a maximum dimension of greater than 2 cm. A total of 775 flakes were recovered from the site. The majority of these, 78 percent, are tertiary flakes indicating that final stages of the lithic reduction process took place at the site. All flakes appear to be Winterset chert.

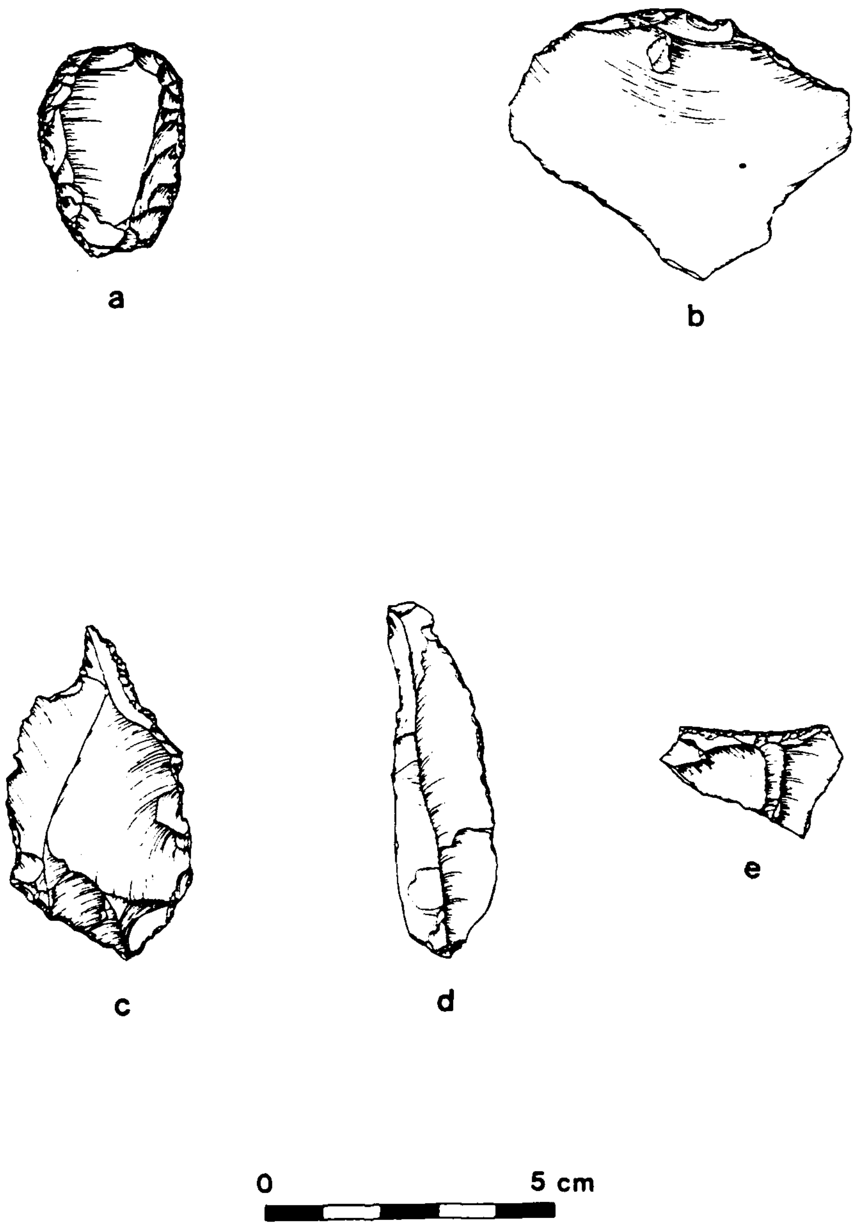


Figure 99. Unifacial tools from 23JA155: (a) scraper, (b-e) edge-modified flakes.

Table 36. Descriptive data for edge-modified flakes from 23JA155.
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CATALOG NUMBER	PROVENIENCE	DATUM DEPTH	MATERIAL TYPE	RETOUCHED	EDGE SHAPE AND WEAR* Convex Straight	Concave	Projec.	WEIGHT	DIMENSIONS Length	Width	Thickness
17	E499,N498	7.40-7.50	WS		1S			9.0	48	42	8
21	E499,N498	7.40-7.50	WS		1A			1.5	22	21	3
27	E499,N499	7.20-7.30	WS		1A			5.6	39	24	9
33	E499,N499	7.20-7.30	WS			1S		4.0	25	25	8
34	E499,N499	7.20-7.30	WS		1S			9.1	53	32	5
35-1	E499,N499	7.30-7.40	WS		1A			5.7	44	23	7
35-2	E499,N499	7.30-7.40	WS		1S			-	-	10	3
37	E499,N499	7.30-7.40	WS	+	1S			3.1	44	17	6
48-1	E499,N499	7.40-7.50	WS		1A			2.3	43	15	5
48-3	E499,N499	7.40-7.50	WS		1A			0.7	22	15	3
48-4	E499,N499	7.40-7.50	WS	+		1S		-	-	14	2
50	E499,N499	7.40-7.50	WS		1A		+	21.5	51	41	18
51	E499,N499	7.40-7.50	WS			1S		0.7	18	17	3
69	E501,N498	7.00-7.50	WS		1S			-	-	15	4
80	E501,N498	7.30-7.40	WS		1A			-	-	10	3
88-2	E501,N498	7.50-7.60	WS		1S			35.1	60	38	22
92	E501,N498	7.50-7.60	WS		1S,1A			24.3	50	43	15
104	E501,N498	7.70-7.80	WS		1A			12.5	50	30	14
106	E501,N498	7.70-7.80	WS		1S			1.8	21	18	4
116	E501,N498	7.80-7.90	WS		1A		+	-	-	21	7
133	E501,N500	6.90-7.0	WS		1A	1S		3.1	34	27	6
145	E501,N500	7.10-7.20	WS		1A			2.0	35	21	3
150	E501,N500	7.20-7.30	WS	+	1S		+	-	-	12	3
152-1	E501,N500	7.20-7.30	WS		1A			3.1	40	24	3
152-2	E501,N500	7.20-7.30	WS		1A			9.6	46	28	9
160-1	E501,N500	7.30-7.40	WS		1A			-	-	21	5

(continued)

Table 36. Descriptive data for edge-modified flakes from 23JA155.
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CATALOG NUMBER	PROVENIENCE	DATUM DEPTH	MATERIAL TYPE	RETOUCHED	EDGE SHAPE AND WEAR* Convex Straight	Concave	Projec.	WEIGHT	DIMENSIONS Length	Width	Thickness
160-3	E501,N500	7.30-7.40	WS	+	1S			19.1	44	41	12
162	E501,N506	7.35	WS		1S,1A			76.0	82	55	21
166-1	E501,N500	7.40-7.50	WS			1S		-	-	13	5
167	E501,N500	7.40-7.50	WS		1S			2.3	41	17	4
168	E501,N500	7.40-7.50	WS		1A			8.2	35	31	8
173	E501,N500	7.50-7.60	WS			1S		-	-	12	6
174	E501,N500	7.50-7.60	WS		1A			4.3	34	24	11
177-2	North Trench	7.45-7.55	WS		1S			16.4	49	44	10
194	North Trench	7.84	WS		1S			17.1	59	42	8
199-2	North Trench	7.90-8.10	WS		1S			-	-	16	7
199-4	North Trench	7.90-8.10	WS		1A	1S		33.6	68	52	12
21679	E500,N499	7.39	WS		2A			32.9	56	36	20
226	E501,N499	7.00	WS		1A			8.4	45	25	9
239	E501,N501	7.20-7 30	WS				+	9.7	50	24	12
240	E501,N501	7.10-7.20	WS		1S			1.3	23	19	3
247	E501,N501	7.30-7.40	WS	+	1S			1.5	28	13	4
255	E501,N501	7.40-7.50	WS	+	1S			2.6	33	20	5
257	North Trench					1A		5.1	72	42	12
262-1	E500,N498	7.50-7.60	WS					-	-	12	3
277	E501,N501	7.48	WS		1A			2.6	30	23	5
303	E501,N501	7.72	WS				+	23.1	56	41	13
304	E501,N501	7.71	WS		1A			1.4	61	18	7
324-1	E500,N498	7.40-7.50	WS		2S			3.9	23	17	10
324-2	E500,N498	7.40-7.50	WS		1S			2.6	21	15	9

(continued)

Table 36. Descriptive data for edge-modified flakes from 23JA155.
Page 3

CATALOG NUMBER	PROVENIENCE	DATUM DEPTH	MATERIAL TYPE	RETOUCHED	EDGE SHAPE AND WEAR* Convex Straight	Concave	Projec.	WEIGHT	DIMENSIONS Length	Width	Thickness
326-1	E500,N498	7.50-7.60	WS			1S		-	-	15	4
326-2	E500,N498	7.50-7.60	WS			1S		1.0	24	20	3
327	E500,N498	7.60	WS		1A			-	-	27	10
340	E500,N498	7.75	WS		1A			6.9	52	22	6
341	E500,N498	7.78	WS			1A		10.6	59	29	10
349-1	E500,N498	7.90-8.0	WS			1S		3.1	49	17	5
374	E501,N499	7.40-7.50	WS		1S			2.3	33	17	5
375	E501,N499	7.50	WS		1S			46.1	58	40	27
384-1	E501,N499	7.50-7.60	WS		1A			4.1	47	22	6
384-2	E501,N499	7.50-7.60	WS		1A			-	-	20	6
385	E501,N499	7.50-7.60	WS			1A	+	9.2	50	40	8
393	E501,N499	7.68	WS		1S			23.9	59	40	16
394	E501,N499	7.65	WS		1S			-	-	27	12
402	E501,N499	7.70-7.80	WS	+		1S		4.4	32	31	5
411	E501,N499	7.84	WS		1S			-	-	23	6
423	E499,N498	7.58	WS		1S	1A		15.8	51	32	12
426	E499,N498	7.55	WS		1S			14.5	49	40	10
440-1	E494,N498	7.80-7.90	WS			1S		3.5	33	22	6
440-2	E499,N498	7.80-7.90	WS		2A			6.5	44	28	6
453	E501,N500	7.60	WS		1A			11.1	42	26	10
457	E501,N500	7.65	WS		1S			7.6	48	30	8
466	E501,N500	7.71	GWS		1A			-	-	23	5
481	E500,N499	7.30	WS			1S		7.0	42	29	6
519	E502,N499	7.59	WS	+	1A			-	-	-	6
539	E502,N499	7.85	WS		1A,1S			-	-	-	12
548	E502,N500	7.30-7.40	WS	+		1S		-	-	20	45

(continued)

Table 36. Descriptive data for edge-modified flakes from 23JA155.
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CATALOG NUMBER	PROVENIENCE	DATUM DEPTH	MATERIAL TYPE	RETOUCHED	EDGE SHAPE AND WEAR* Convex Straight	Concave	Projec.	WEIGHT	DIMENSIONS Length	Width	Thickness
567	E502,N500	7.70	WS	+			1	4.4	39	17	7
573	E502,N500	7.70-7.80	WS		1A,1S			15.0	54	41	8
584	E502,N501	7.20-7.30	WS		1S			-	-	-	3
585	E502,N501	7.23	WS		1A			4.0	41	16	5
595	E502,N501	7.42	WS		1A			9.5	54	21	1
615	E503,N499	7.30-7.40	WS			1S		3.4	33	20	3
632-1	E503,N499	7.60-7.70	WS		1A			2.4	29	18	5
632-2	E503,N499	7.60-7.70	WS			1S		-	-	13	3
632-3	E503,N499	7.60-7.70	WS		1A	1S		7.7	38	21	9
633	E503,N499	7.67	WS	+	1S			-	-	41	12
649-1	E503,N500	7.30-7.40	WS		1A,1S	1A		-	-	-	3
649-2	E503,N500	7.30-7.40	WS			1S		-	-	-	5
654	E503,N500	7.49	WS		2S			6.2	56	31	5
661-1	E503,N500	7.50-7.60	WS		1S			-	-	-	2
661-2	E503,N500	7.50-7.60	WS		1A			-	-	-	4
683	E503,N501	7.25	WS		1A			-	-	-	2
687	E503,N501	7.31	WS		1S			-	-	-	17
695	E503,N501	7.49	WS		1S			12.3	44	24	13
712	E503,N501	7.51	WS		1S			6.1	43	28	8
713	E503,N501	7.56	WS		1A			3.6	46	24	4
721	E503,N501	7.68	WS		1S			29.2	48	41	15

Figure 100. Cores, tabloid, and hammerstone from 23JA155: (a-b) cores, (c) tabloid, (d) hammerstone.

Chips (n=901)

Chips consist of small flakes with a maximum dimension of less than 2 cm. All chips from 23JA155 appear to be Winterset chert.

Hammerstones (n=2)

One Winterset chert core (Fig. 100d) and one fragmentary core from 23JA155 have battered edges indicating use as hammerstones. Descriptive data is summarized in Table 37.

Ground Stone Tools

Three artifacts exhibiting intentionally ground surfaces were recovered from 23JA155. Included is a mano with additional utilization as a nutting stone, an abrader, and fragment of a ground stone tool.

Mano (n=1)

The mano from 23JA155 is a circular fine-grained sandstone cobble with a smooth rounded surface. The mano is 120 mm in length, 101 mm in width and 33 mm in thickness. Additional use of the implement as a nutting stone is indicated by a circular pecked depression on the opposite face. The tool was likely used in conjunction with metates for processing of plant food, mainly seeds.

Abrader (n=1)

One limestone abrader was recovered from Cold Clay. The specimen is 51 mm in length, 26 mm in width and 13 mm in thickness. The abrader was probably used for smoothing materials such as bone or wood.

Groundstone Fragment (n=1)

One broken tool of a fine-grained sandstone has a smooth rounded surface. The fragment is probably a section of a mano or metate used in plant food processing.

Faunal Remains

Faunal remains were recovered from 23JA155 but consisted of small fragments of burnt bone. The entire sample consists of 298 fragments with a combined weight of 43.9 g (Table 38). Of this number only 18 fragments are identifiable. Included are three fragments identifiable as deer (*Odocoileus* sp.) and 15 identifiable as turtle (*Testudinoid*).

The deer remains included three molars and a pisiform. Two of the molars are badly fragmented. The turtle remains consist of small sections of the carapace, many of which are burnt white. While the turtle remains were not identifiable to a specific level they closely resemble box turtle (*Terrepene* sp.). The large number of unidentified remains consist principally of small sections of burnt bone. The majority of these appear to be large mammal, probably deer bone; however, at least one small mammal or a bird is also represented.

Table 37 . Descriptive data for cores from 23JA155.

CATALOG NUMBER	PROVENIENCE	DATUM DEPTH	MATERIAL TYPE	CORTEX PRESENT Absent	<50%	50%	WEIGHT (g)	DIMENSIONS (mm) Length	Width	Thickness
88-1	E501,N498	7.50-7.60	Winterset		+		60.8	58	44	30
108	E501,N498	7.70-7.80	Winterset		+		36.2	48	39	22
109	E501,N498	7.80-7.90	Winterset			+	375.3	110	81	49
196	North Trench	7.86	Winterset	+			180.1	111	63	36
267	North Trench	7.49	Winterset		+		318.1	86	79	65
276	E501,N501	7.47	Winterset			+	279.2	95	83	56
287	E501,N501	7.59	Winterset			+	423.1	109	81	76
295	E501,N501	7.66	Winterset		+		441.4	133	67	55
365	E501,N499	7.38	Winterset		+		90.7	64	47	35
410	E501,N499	7.84	Winterset			+	346.3	111	73	37
424	E499,N498	7.55	Winterset	+			64.5	66	43	25
425	E499,N498	7 59	Winterset		+		337.5	76	74	49
456	E501,N500	7.66	Winterset		+		216.0	101	66	37
662	E503,N500	7.57	Winterset		+		101.2	60	52	36
670	E503,N500	7.63	Winterset		+		50.4	47	42	38
688	E503,W501	7.33	Winterset	+			61.4	45	42	33
711	E503,N501	7.51	Winterset	+			135.0	57	55	42
746	East Trench	8.01	Winterset			+	1700.9	109	100	72
754	E499,N498	7.94	Winterset		+		79.1	70	51	26
763-2	East Trench	-	Winterset		+		307.7	85	68	50
49*	E499,N499	7.40-7.50	Winterset				31.6	46	29	25
737*	South Trench	7.40	Winterset				141.8	68	52	42

*Hammer wear present

Table 38. Number of fragments of faunal remains recovered from 23JA155.

	EXCAVATION LEVEL													
	7.0-7.1	7.1-7.2	7.2-7.3	7.3-7.4	7.4-7.5	7.5-7.6	7.6-7.7	7.7-7.8	7.8-7.9	7.9-8.0	8.0-8.1	East Trench	South Trench	TOTAL
IDENTIFIED														
Odocoileus sp.						1			3					4
Testudinoid					8		3	4						15
Total					9	1	3	4	3					19
UNIDENTIFIED	1	4	2	20	33	38	62	29	39	15	10	10	16	279
TOTAL	1	4	2	20	41	39	65	33	42	15	10	10	16	298

DISCUSSION AND RECOMMENDATIONS

The Cold Clay site (23JA155) contains evidence of two vertically stratified occupations. The upper component was tested by Brown (1976) who recovered a few flakes and a contracting stemmed projectile point from the surface and just below, suggesting a Late Archaic-Middle Woodland cultural affiliation. Further testing in 1979 failed to recover additional materials from this component. The second component was discovered during geomorphological backhoe trenching operations in 1979; it was found to consist of Archaic deposits deeply buried in the T-1 terrace fill.

The terrace fill at Cold Clay consists of two alluvial units referred to as Units A and B. Unit B contains the upper cultural component and extends from the surface to a depth of 70 cm. The Unit B sediments consist of brown-dark gray silt loams with a weakly developed soil structure. The underlying Unit A deposit is a mottled gray brown silty clay loam, capped by a dark gray paleosol with moderately developed soil structure. Humic acids in this paleosol have been dated at 4245±170 B.P., indicating a period of depositional stability on the flood plain of the Little Blue at ca. 4200 B.P. Underlying the paleosol is a bed of coarse gravel representing a period of intense gully washing and erosion from the adjacent hillside. The buried cultual deposit is

located below the gravel lens and consists of a stratum approximately 70 cm in thickness which gently dips to the south. This deposit contains a scatter of broken tools, lithic manufacturing debris, small fragments of burnt bone, and flecks of charcoal. Radiocarbon dates from the buried deposits range from 4540-4180 years B.P.

Based on the information recovered from the site, the lower component appears to have been a relatively small campsite occupied by Late Archaic hunter-gatherers. The vertical distribution of artifacts appears to be due to extensive burrowing by crayfish. The artifact assemblage includes general occupational debris such as projectile points, bifacial knives, blanks and preforms, a scraper, cores chunks, shatter, debitage, and hammerstones. Minerals such as hematite and limonite are present. A considerable amount of unworked stone is present, much of which is probably colluvial slope wash from the adjacent hillside.

The relative frequencies of the various tools categories present at 23JA155 provides information concerning the activities that took place at the site. Table 39 presents the frequencies of the various tool categories and the inferrred activity or activities indicated. Tools associated with scraping tasks predominate. Flakes with step fracture edge-modification and the single unifacial scraper comprise 43.9 percent of the assemblage. A second activity with a high frequency of occurrence (35.3 percent) includes edge-modified flakes with attritional wear indicative of use as light duty cutting tools. Heavy duty activities, as indicated by bifacial knives, accounts for 7.2 percent of the assemblage. Tools broken or discarded in the lithic reduction process or used in tool manufacture comprise 5.8 percent. Tools used in perforating, hunting, plant processing, and smoothing are low, comprising 4.3, 2.2, 0.7, and 0.7 percent of the inventory respectively. In summary, the assemblage from 23JA155 is best characterized as dominated by small flake tools, although a substantial number of larger bifacial tools are also present.

While no features were recovered at the site, the presence of scattered charcoal in the midden indicates the presence of nearby hearths. That food preparation activities were associated with these hearths is indicated by the numerous faunal specimens recovered. Faunal remains recovered from the site indicate the exploitation of primarily white-tailed deer, although small species such as turtles were also used.

Perhaps the most important activities that took place at the site were procurement of chert from the Winterset limestone formation above the site and the manufacture of chipped stone tools. The large percentage of tertiary flakes in the debitage sample suggests that final stage lithic reduction took place at the site. This is confirmed by the low percentage of chunks and shatter present in the sample. Initial stage reduction of Winterset chert probably occurred on the hilltop above 23JA155 where the Winterset chert was procured.

The location of the nearby Winterset chert outcrops providing easy accessibility to quantities of raw materials may well have played an important part in the selection of Cold Clay as a campsite. Another factor may have

Table 39. Frequencies of inferred activities from lithic tools from 23JA155.

INFERRED ACTIVITY	Projectile Points	Bifacial Knives	Preforms/Blanks	Scraper	Edge-Modified	Hammerstone	Mano	Abrader	TOTAL	PERCENT OF TOTAL
Scraping				1	60				61	43.9
Light Duty Cutting					49				49	35.3
Heavy Duty Cutting		10							10	35.3
Tool Manufacture			6			2			8	5.8
Perforating					6				6	4.3
Hunting	3								3	2.2
Plant Food Processing							1		1	0.7
Smoothing								1	1	0.7
TOTAL	3	10	6	1	115	2	1	1	139	100.1

been the availability of spring water. The Pleasanton shale which underlies 23JA155 locally contains a sandy unit known as the Knobtown facies which produces water throughout the year.

The Archaic period in the Kansas City area is relatively unknown. Most of the sites that have been investigated can be assigned to the Late Archaic Nebo Hill complex (Shippee 1948, Reid 1978, Reeder 1978). Radiocarbon dates for Nebo Hill components at the Nebo Hill site and at the Sohn site are 3555±65 and 2970±490 B.P. respectively. 23JA155 has been dated to 4550±115 B.P. indicating a temporal position for Nebo Hill occupation of the area from approximately 3000-4500 years B.P.

The data recovered from Cold Clay indicates the presence of a Late Archaic component in the Little Blue River Valley which is time equivalent with the Nebo Hill occupation of the area. The component at 23JA155 is characterized by a heterogeneous projectile point assemblage including a combination of lanceolate, stemmed and notched points. There is a predominance of ovate bifacial knives in the chipped stone tool assemblage. Based on these characteristics, the assemblage at 23JA155 shows a number of striking similar-

ities to Archaic sites in the Flint Hills area of eastern Kansas, especially Unit III at Coffey (Schmits 1978, 1980) and Snyder (Grosser 1977). The corner-notched point from 23JA155 is almost identical to a point recovered from the Chelsea phase at Snyder. Slightly earlier dates of 4830±05 and 4600± 125 B.P. have been obtained from the Chelsea phase at Snyder.

Cold Clay is presently one of the oldest securely dated human occupations in the Kansas City area. The buried condition of the site has resulted in preservation of organic faunal and floral remains. Consequently, the site is a significant cultural resource important in terms of regional research problems associated with hunter-gatherer adaptations in the Plains border region. The site is located in the Blue Springs Lake Archaeological District which has been determined to be eligible for the National Register of Historic Places.

RECOMMENDATIONS

The terrace fill in which 23JA155 is located is between the multipurpose pool (802.0 ft above M.S.L.) and the flood control pool (820.3 ft above M.S.L.) for the Blue Springs Lake, presently under construction by the U.S. Army Corps of Engineers, Kansas City District. The upper component at the site appears to contain minimal information. It will not likely produce substantial additional information and is not significant. It will likely be destroyed by wave action when the lake level is raised to the flood pool level. The buried component is extremely significant and will receive limited adverse impact from wave action undercutting the face of the terrace at the site when the lake waters are kept within the multipurpose pool level. It will be more severely damaged by erosion when the reservoir level is raised to the flood pool level. Due to the significance of the buried component at the site it is recommended that appropriate action be taken to preserve the site or that extensive data recovery investigations be initiated.

SUMMARY

Cold Clay is a buried Late Archaic occupation located in the T-1 terrace of the Little Blue River. Artifacts recovered from the buried component indicated that scraping, cutting tool manufacturing, hunting and plant food processing activities took place at the site. The site is a significant cultural resource which, as part of the Blue Springs Lake Archaeological District, has been determined eligible for the National Register of Historic Places. Activites associated with the construction of Blue Springs Lake should be modified to preserve this important cultural resource.

CHAPTER IX

PHASE II TEST EXCAVATIONS AT BLACK BELLY (23JA238)

Larry J. Schmits and Thomas P. Reust

INTRODUCTION

23JA238 is located in Blue Springs Corps Tract 136 at an elevation of 790 ft (240 m). The site was discovered by the senior author in December, 1978 while conducting an inspection of cut banks on the East Fork of the Little Blue. Artifacts eroding from the bank included a corner-notched dart point, a cordmarked body sherd, and lithic waste debris. The visible evidence indicated the presence of a thick Woodland or Mississippian period occupation buried in the T-1 terrace and thus of considerable potential significance. Phase II test excavations were conducted at the site in 1979 by Soil Systems, Inc. These investigations were made possible by a change order in contract DAW41-79-C-0006 which substituted test excavations at 23JA238 and 23JA155 in lieu of data recovery investigations at 23JA109.

23JA238 is located along a cut bank on the north side of a meander of the East Fork of the Little Blue River (Fig. 101). The valley in the area of this site is about 440 meters in width along a southwest-northeast transect. Based on air photo interpretations, at least two terrace surfaces are present in the area of the site. The lower T-0 is present in several areas just to the south of the present channel. This higher T-1 comprised the greater portion of the flood plain surface and exhibits numerous depressional areas resulting from previous meandering of the Little Blue River. Based on geomorphological research (Kopsick: this volume) aggradation of the T-1 terrace ceased at approximately 2000 B.P. Wood secured at a depth of 2.5 m below the surface from an oxbow pond approximately 150 m northwest of 23JA238 has been dated at 1460+-55 B.P. or A.D. 490 (DIC-1681). This date indicates that the old T-1 meanders were filling during Middle Woodland times.

DESCRIPTION OF THE EXCAVATIONS

The 1979 test excavations consisted of two test blocks and three one by two m test units (Fig. 2). Test Block A was a two by four m block opened along the cut bank where evidence of the buried deposits had first been discovered (Fig. 103). Excavations within this block were taken to a depth of 1.6 m below the surface. These excavations revealed a thin scatter of cultural debris in the upper 70 cm including some historic materials. A concentrated cultural stratum was encountered at 90 cm below the surface and extended to a depth of 150 cm. Little or no material was encountered below 1.5 m below the surface.

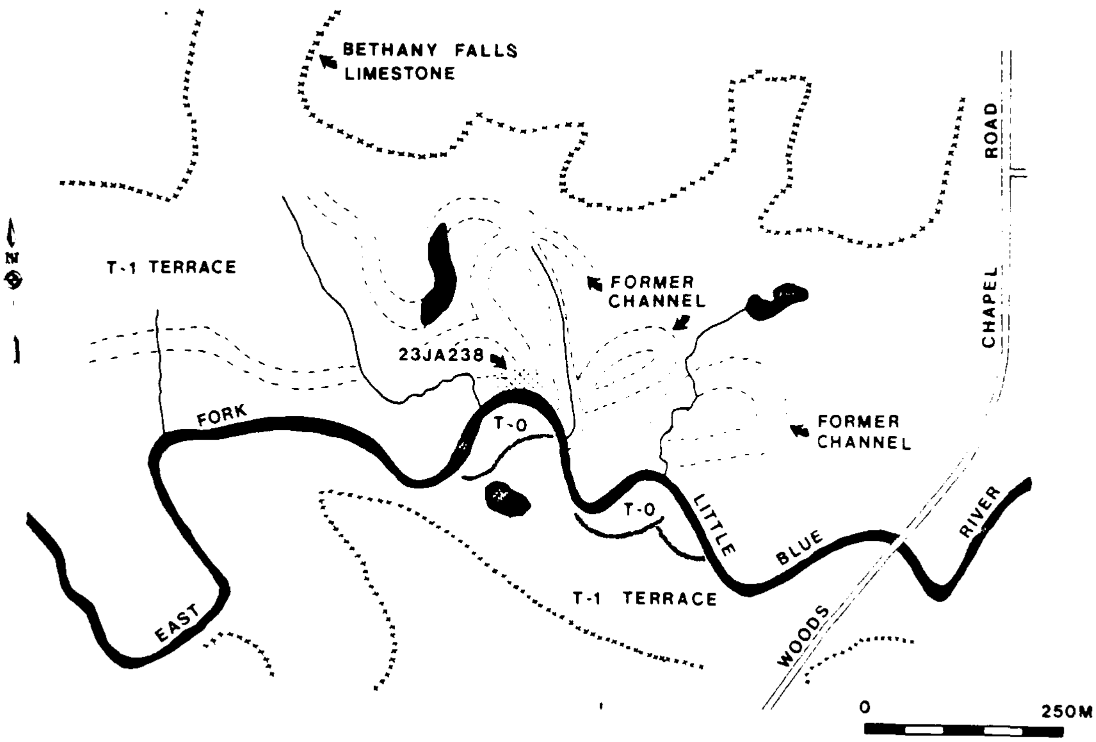

Figure 101. Map of East Fork of Little Blue Valley showing the location of 23JA238, flood plain geomorphology and Bethany Falls Limestone outcrops. Blackened areas indicate ponds.

In order to determine the northern extent of this buried cultural deposit three test units were laid out on a north-south transect along the east 100 baseline. The first two or three (Test Units 1 and 2) were taken to a depth of 130 cm below surface. Concentrated materials were encountered from 30-40 cm. While artifacts were encountered from the cultivation zone (0-30 cm) and extended to the base of the excavations, they were concentrated at 30-70 cm below the surface. No ceramics or other diagnostic artifacts were recovered from Test Units 1 and 2. While the presence of an older surface could not be defined during the excavation, the concentrated deposits noted at 90-150 cm in Test Block A appeared to be located nearer to the surface in Test Units 1 and 2 suggesting that the cultural occupation was located on a surface that sloped to the south.

A third test pit, Test Unit 3, was taken to 80 cm below the surface. A concentrated zone of deposits was located at 40-60 cm. Recovered from this zone was a contracting stemmed dart point indicating a Woodland cultural affiliation for the deposits. This older point provided additional evidence

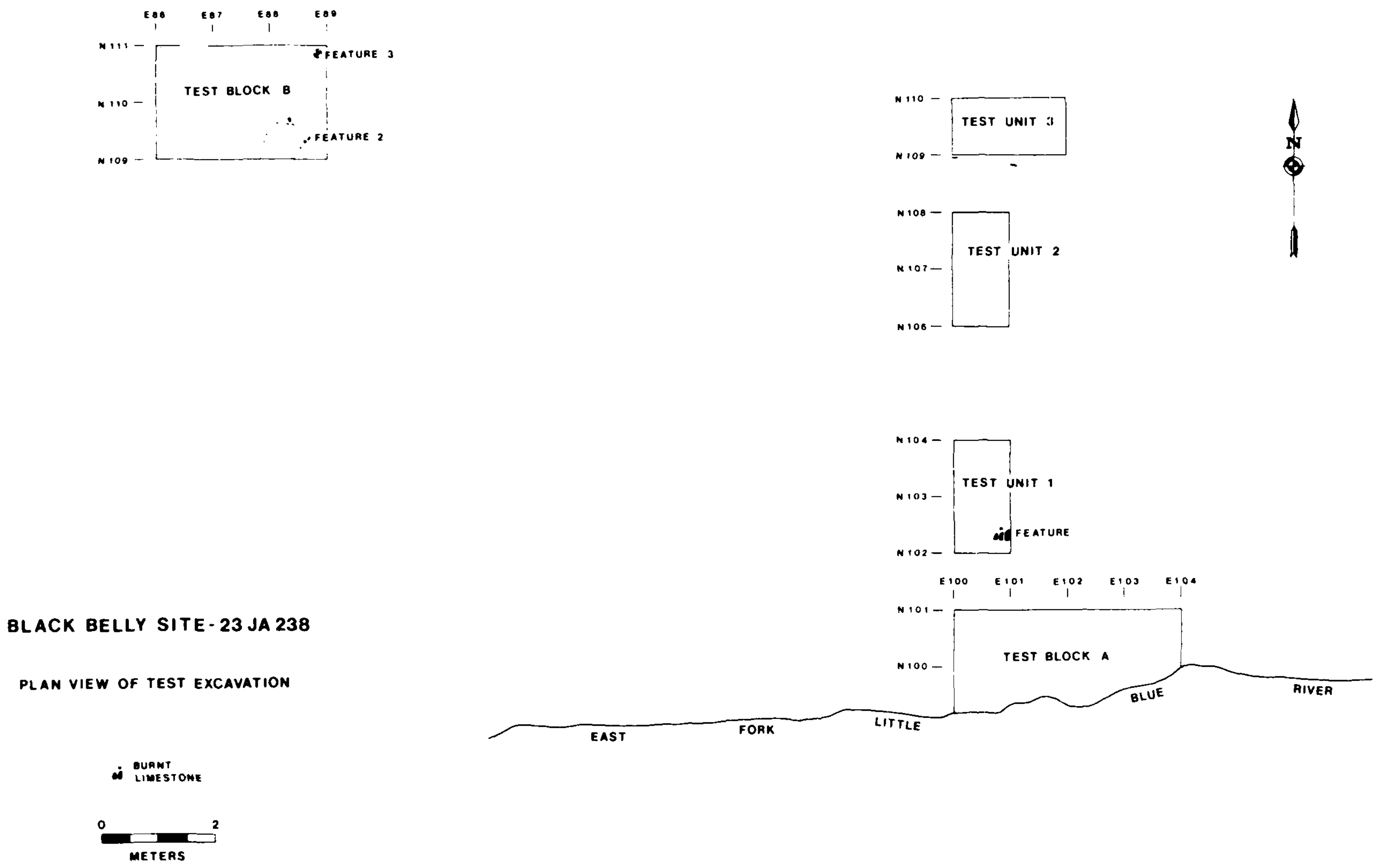

Figure 102. Plan view of test excavations and features at 23JA238.

Figure 103. General view of test excavations along the river bank (Test Block A) at 23JA238.

that we were dealing with a two component site located in a complex alluvial cut and fill sequence.

The final excavation at 23JA238 consisted of a small block located 14 m to the west of Test Unit 1. This block initially consisted of a test unit which encountered a concentrated cultural zone at 30-90 cm below the surface. This deposit contained a thin scatter of charcoal mixed with Woodland artifacts. The test unit was then expanded into a two by three m block to recover an additional sample of diagnostic material and sufficient charcoal for dating.

The test excavations at 23JA238 indicated the presence of two components: a Mississippian period occupation similar to that encountered at the Seven Acre site (Brown 1979) and at the May Brook site (Schmits 1980) and an earlier Woodland period occupation. The later component is concentrated along the river bank from 80-135 cm below the surface. The Woodland component was

located about ten m north of the river bank and extended over 14 m to the west.

Flotation samples totaling 177.5 liters were processed from 23JA238. Samples were taken mainly from areas which appeared to contain organics or a concentration of lithics. The entire fill of each feature was floated. A total of 19 liters of soil was processed from Test Block A. Material recovered included charcoal, six carbonized nut fragments, several small bone fragments, and small amounts of debitage. A total of 19 liters was floated from Test Units 1 and 2, including nine liters from Feature 1. Material recovered included several carbonized seeds and small chert flakes. A total of 139.5 liters was processed from Test Block B including the entire fill from Feature 2 (65 liters) and Feature 3 (3.5 liters). Material recovered from the features in Test Block B included charcoal, numerous carbonized nut fragments, a few carbonized seeds, numerous burnt bone fragments, along with ceramics, and small lithic debris. Material recovered from non-feature samples in this block consisted primarily of small chert flakes.

Stratigraphy

The presence of the two components in a complex alluvial cut and fill sequence made detailed examination of the sediment profile at the site essential. Based on the cut bank and the profiles exposed by the test excavations the stratigraphy of the site consists of two alluvial units with very similar physical and chemical properties (Fig. 104). The only distinguishing feature between the two deposits is the degree of soil development. The lower deposit (Unit A) has a blocky structure capped by a buried paleosol (II B horizon) with a strongly developed angular blocky structure. The upper surface of this horizon, which is the contact between the two units, is located 90 cm below the surface along the river bank and slopes steeply upward to the north. In the profiles of the northernmost one by two m test pit and Test Block B it is located 25 cm below the surface. The buried alluvial unit is overlain by Unit B, a wedge-shape deposit of more recent alluvium with a poorly developed granular soil structure.

The internal stratigraphy within the two units was best defined along the west wall of the Test Block A river bank. Here the upper Unit B sediments extend below this to 350 cm in the river bank cut. Only the upper 60 cm of Unit A was intersected by the excavation. Sediment samples were taken (from the bank cut) to a depth of 400 cm. Their color, texture, and structural characteristics are presented in Table 40. As Table 40 indicates the color and texture of the sediments are a uniform dark grayish-brown clayey silt and silty clays. Based primarily on structural development, the upper 30 cm portion of Unit B is defined as an A11 horizon, the 30-55 cm section as an A12 horizon, and the 35-85 cm portion as a C1 horizon. The upper 60 cm part of Unit A has a blocky structure and is interpreted to be a truncated paleosol. The upper 25 cm of this paleosol has a strong fine subangular blocky structure (IIB2 horizon), while the lower 35 cm has a coarse angular blocky structure (II3 horizon). Sediments below the paleosol consist of dark grayish brown to grayish brown silty clays with a weak fine subangular block structure (IIc horizon).

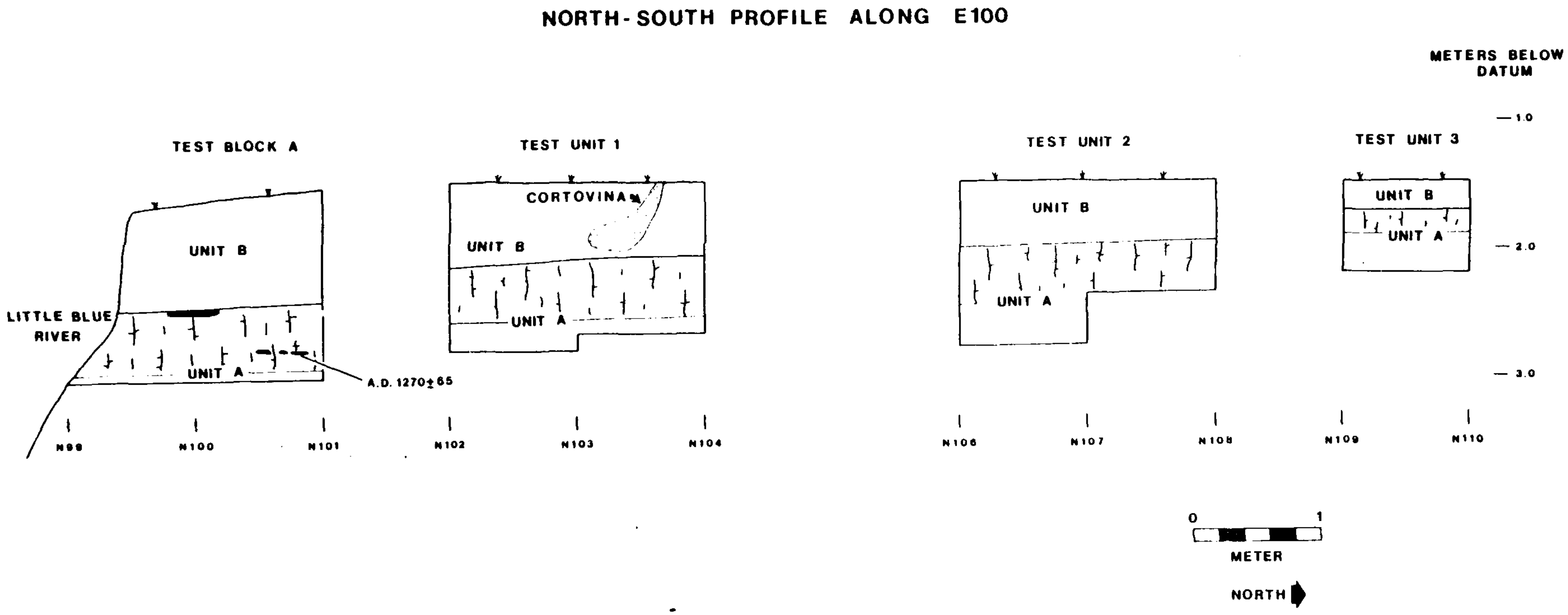

Figure 104. North-south stratigraphic profile along the west wall of Test Block A and Test Units 1-3 at 23JA238.

Table 40. Descriptive data for sediment profile E100,N100 of 23JA238.

UNIT	SOIL HORIZON	SURFACE DEPTH cm.below surface	COLOR	TEXTURE	STRUCTURAL DESCRIPTION
B	A11	0-30	very dark grayish brown (10YR3/2)	clayey silt	weak granular
B	A12	30-55	very dark grayish brown (10YR3/2)	clayey silt	moderate granular
B	C1	55-85	very dark grayish brown (10YR3/2)	clayey silt	weak fine subangular blocky
A	IIB2	85-110	dark brown (10YR3/3)	silty clay	strong fine subangular blocky
A	IIB3	110-145	very dark grayish brown (10YR3/2)	silty clay	coarse angular blocky
A	IIC	145	dark grayish brown (10YR4/2)	silty clay	weak fine subangular blocky
A	IIC	210	dark grayish brown (10YR4/2)	silty clay	weak fine subangular blocky
A	IIC	260	dark grayish brown (10YR4/3)	silty clay	weak fine subangular blocky
A	IIC	400	grayish brown (10YR5/2)	silty clay	weak fine subangular blocky

Radiocarbon Dates

Two radiocarbon dates were obtained from charcoal recovered from 23JA238 (Table 41). Both samples are based on a radiocarbon half life of 5568 years. DIC-1603 was recovered from E101, N100 in Test Block A at a datum depth of 2.80-2.90 (120-130 cm below surface) in the buried soil horizon. This sample was from the Mississippian period May Brook phase component at the site. It is similar to the dates recovered from the May Brook site (Schmits 1980) and the Seven Acre site (Brown 1979). The second radiocarbon sample (DIC-1680) was based on charcoal recovered from 50-85 cm below the surface (1.81-2.21 m below datum) in Unit E88, N110 of Test Block B. This sample was associated with and dates the Woodland component at the site at A.D. 330±45. Exactly the same date was obtained on the Woodland component at 23JA143 located a short distance downstream from 23JA238.

Table 41. Radiocarbon dates from 23JA238.

LAB. NO.	STRAT UNIT	DATUM DEPTH	DATE B.P.	DATE A.D.
DIC-1603	A	2.80-2.90	680±65	1270
DIC-1680	A	1.86-2.21	1620±45	330

CULTURAL FEATURES

Three cultural features were encountered in the test excavations at 23JA238, including a cluster of burnt limestone cobbles, a basin-shaped hearth, and concentration of limestone cobbles in a shallow pit (Fig. 102). The cluster of limestone cobbles is probably associated with the May Brook phase component; the other two are from the Woodland component.

Feature 1: Feature 1 was located in Test Unit 1 two meters north of Test Block A along the riverbank (Fig. 102). This feature consisted of four fire reddened limestone cobbles at a depth of 2.33 m below datum or 83 cm below ground surface. No discernible concentration of charcoal or burned earth was noted. Flotation and waterscreening of all nine liters of feature fill yielded little cultural material. Feature 1 is likely associated with the May Brook occupation, although this could not be determined with certainty.

Feature 2: Feature 2 consisted of a circular shaped pit located in excavation units E87-89, N109 and extending into unexcavated units E87-88, N108. The feature is clearly associated with the Woodland component at 23JA238. Excavated dimensions were 74 cm east-west and 60 cm north-south. The pit was

first encountered 58 cm below surface and extended to a depth of 81 cm below surface. The fill of the feature consisted of several fire altered limestone rocks, a heavy concentration of burnt clay, a small amount of charcoal, and numerous fragments of burnt bone. Flotation and water screening of a pit fill (72 liters) produced nearly 500 extremely small charred bones with a weight of 7.1 g, over 500 small resharpening or pressure flakes (1-3 mm in diameter), and three small sherds. Evidence of in situ burning and the amount of charred bone suggest the feature was used as a food preparation hearth.

Feature 3: This feature consisted of a concentration of super-imposed limestone rocks covering a shallow pit. The feature was in the northeast quadrant of E88, N110 at a depth of 75-84 cm below surface. Diameter of the concentration and accompanying stain was 15 cm. Fill of the pit consisted of a moderate amount of charcoal and small bone fragments. The proximity of this feature to Feature 2 and the type of debris suggest a shallow roasting pit. Coals were likely heated in Feature 2, transferred to Feature 3 with meat to be cooked, then covered with the limestone rocks.

ARTIFACT ASSEMBLAGE

A total of 1158 artifacts were recovered from the general excavations at 23JA238. These include 905 from the Woodland component in Test Block B and Test Unit 3, 124 from the May Brook component in the 90-160 cm below surface levels in Test Block A and 129 artifacts of mixed or "unknown" cultural affiliation from the 0-70 cm levels of Test Block A and Test Units 1 and 2. The artifact assemblage consists of ceramics, chipped stone tools, lithic manufacturing debris, minerals, unworked stone, hearthstones, unworked bone and historic materials (Table 42).

Ceramics

Thirty-six ceramic sherds were recovered from 23JA238. Eleven sherds (including two rim sections) were recovered from the May Brook component, 21 body sherds were from the Woodland component, and four body sherds of undetermined affiliation from the test units and the cut bank. The sample from the May Brook component is sufficiently large for study and can be characterized as follows:

> Temper: The temper is crushed sherd with individual temper grains from 0.5 to 2.5 mm in diameter. Evidence of crushed shell temper is also present. The shell has been leached, leaving slot-like holes.
>
> Color: Exterior paste ranges from brown (10YR6/3) to dark grayish brown (10YR4/2). Interior paste color ranges from pale brown (10YR6/3) to very dark gray (10YR3/1). Core color is predominantly very dark gray (10YR4/1).
>
> Surface Treatment: All sherds are cordmarked vertically. Five sherds exhibit smoothing over the cordmarking.

Table 42. Artifact assemblage recovered from Black Belly (23JA238).

	TEST BLOCK B AND TEST UNIT 1 WOODLAND COMPONENT					TEST BLOCK A										TEST UNIT 1 AND 2 UNKNOWN								
						UNKNOWN		MAYBROOK COMPONENT																
	0–30	30–50	50–70	70–90	TOTAL	0–70	70–90	90–100	100–110	110–120	120–130	130–140	140–150	150–160	TOTAL	0–30	30–50	50–70	70–90	90–110	110–130	Cut Bank	TOTAL	SITE TOTAL
CERAMICS	1		20		21			1	2	2	3	1	2		11	1		1				2	4	36
CHIPPED STONE TOOLS																								
Projectile Points		1	2		3	1				2	1				4							1	1	8
Bifacial Knives			2	2	4	1					1	1		1	4					1			1	9
Bifacial Blanks										1	2		1		4									4
Bifacial Scrapers			3		3																			3
Chopper			1		1																			
Biface Fragments	1				1																			
Unifacial Scrapers		1	4	3	8				1	1			1		3		1						1	12
Flake Knife											1				1									
Notch			1		1																			1
Perforator			1		1																			1
Utilized Flake	2	11	16	8	37		2	2		1	1		1		7	2	1	3		2		1	9	55
Total	3	13	30	13	59	2	2	2	1	5	6	1	3	1	23	2	2	3		3		2	12	94
MANUFACTURING DEBRIS																								
Cores			2		2					1					1		1						1	4
Tabloids										1					1									1
Chunks	1	7	9	4	21	1	1	1		4			1		8			1	2				3	32
Shatter	3	8	8	4	23					4	1				5		1	1					2	30
Flakes (2cm)																								
Primary	1	1	2	2	6				1						1		1						1	8
Secondary	3	3	11	3	20			1							1	1	2						3	24
Tertiary	16	41	119	73	249	4	1	8	4	5	2	1	1		26	5	4	8	2		1	4	24	299
Chips (2cm)	33	81	200	117	431	3	4	6	3	14	7	1			38	3	8	17			1		29	498
Total	57	141	351	203	752	8	6	16	8	29	10	2	2		81	9	17	27	4		2	4	63	896

(continued)

Table 42 continued. Artifact assemblage recovered from Black Belley (23JA238).

	TEST BLOCK B AND TEST UNIT 1 WOODLAND COMPONENT					TEST BLOCK A UNKNOWN		TEST BLOCK A MAYBROOK COMPONENT								TEST UNIT 1 AND 2 UNKNOWN								
	0-30	30-50	50-70	70-90	TOTAL	0-70	70-90	90-100	100-110	110-120	120-130	130-140	140-150	150-160	TOTAL	0-30	30-50	50-70	70-90	90-110	110-130	Cut Bank	TOTAL	SITE TOTAL
UNWORKED BONE		2	8	3	13				1	2	6	1			10	1	1	5				1	8	31
MINERALS			1		1													1					1	2
UNWORKED STONE	3	1	5	3	12	2		1		2	1	1	2		9	3	.	3	8	1			15	36
HEARTH STONES	1	5	36	5	47	1		2		1	3	1	1		9				4				4	60
HISTORIC						1		1	1						3									3
TOTAL	65	162	451	227	905	14	8	23	13	41	29	7	10	1	146	16	20	40	16	4	2	9	107	1158

Rim Sherds (n=2)

Both rim sherds from the May Brook component have vertically cordmarked exterior surfaces and appear to be sections of the same vessel (Figs. 105a-b). The exterior surface was well smoothed after cordmarking. Rims are straight and undecorated, lips are flattened. Rim height is 25 mm, rim thickness 5-6 mm, and the lip thickness is 3 mm. Exterior color is brown (10YR5/3), interior color is light yellowish-brown (10YR6/4), and core color is dark gray (10YR4/1).

Body Sherds (n=9)

All May Brook component sherds are cordmarked (Fig. 105c-d). These sherds are smoothed after cordmarking. Five are tempered with crushed sherd and four with shell. Thickness ranges from 5-9 mm. Exterior surfaces range from very pale brown (10YR7/4) on the smoothed sherds to dark grayish-brown (10YR4/2) on the unsmoothed sherds. Interior surfaces are predominantly dark gray (10YR4/1) to very dark gray (10YR3/1). Core color is from gray (10YR5/1) to very dark gray (10YR3/1).

Twenty-one body sherds were recovered from the Woodland component (Fig. 105f). Nineteen small fragmentary sherds (0.5 to 3 cm in maximum dimensions) were located in the same excavation unit and level and appear to be sections from one large sherd. Temper in all sherds appears to be grit or sand ranging from 0.5 to 3.0 mm in diameter. Temper makes up as much as 20 percent of the matrix. Surfaces on all sherds are friable and undecorated when identifiable. Exterior color is reddish-yellow (7.5YR7/6). Interior surfaces are blackened on all sherds. Core color varies from light brownish-gray (10YR6/2) to very dark gray (10YR3/1).

Two small badly weathered sherds were recovered from Test Unit 2. The tempering material appears to be sand. Two additional body sherds were found along the cut bank just west of the test excavations. One is sherd-tempered and one is grit tempered.

Chipped Stone Tools

Ninety-four chipped stone tools were recovered from 23JA238. Twenty-one of these were from the May Brook component, 59 from the Woodland occupation, and 14 from deposits of undetermined affiliation. The raw material for the tools is predominantly blue-gray Winterset chert which outcrops locally.

Bifacial Tools

Bifacial artifacts recovered at 23JA238 include projectile points, bifacial knives, bifacial scrapers, a chopper, bifacial blanks, and a small biface fragment. Descriptive data for bifacial artifacts is present in Table 43.

Projectile points (n=8)

Three small incomplete triangluar arrow points were recovered from the May Brook phase deposits (Fig. 106a-c). Two unnotched arrow points with straight bases are broken distally; one of these is of a non-local white chert and exhibits bifacial pressure flaking (Fig. 106b). The other unnotched point

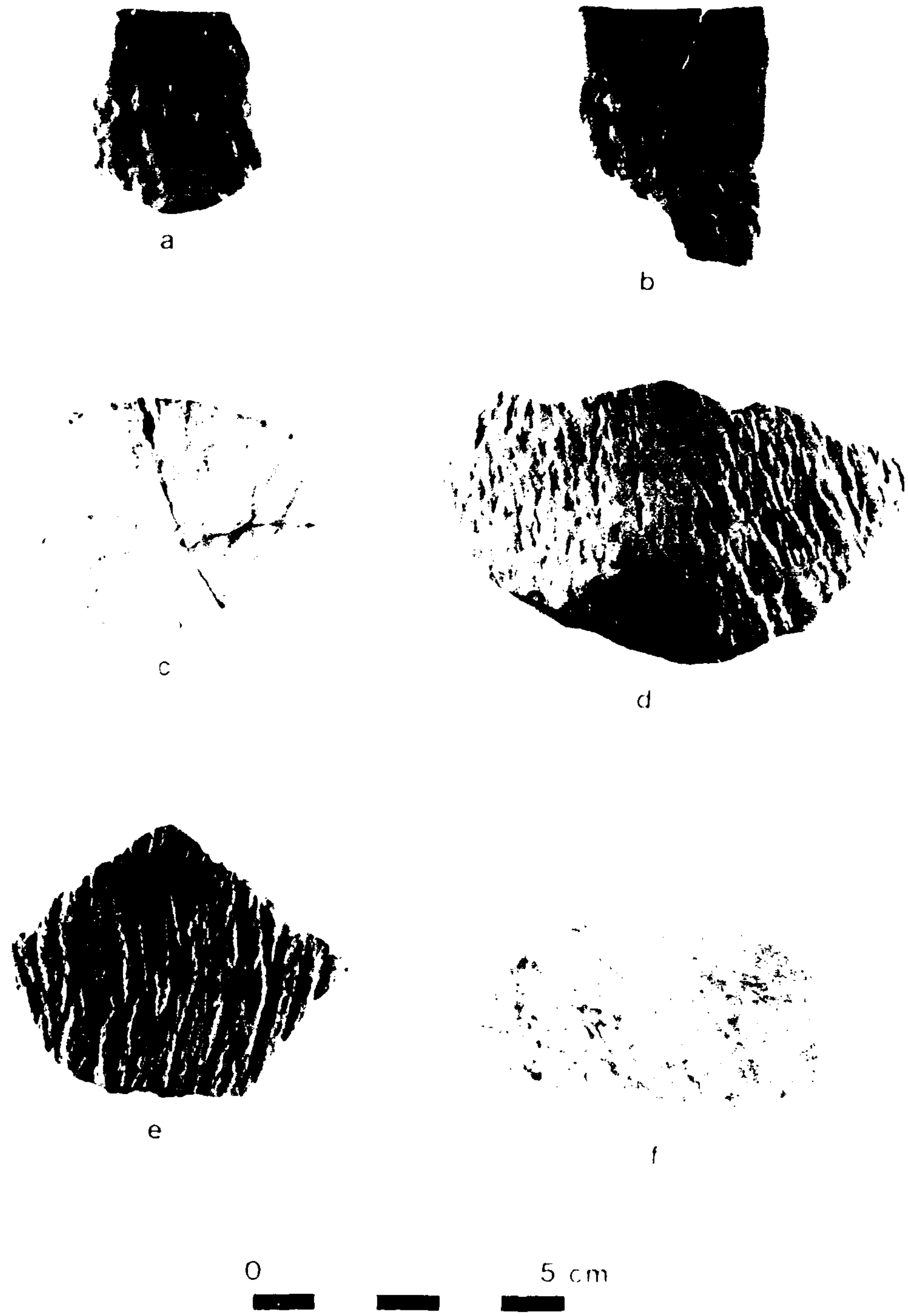

Figure 105. Ceramics from 23JA238: (a-e) May Brook phase component, (f) Woodland component.

Table 43. Descriptive data for bifacial tools from 23JA238

CATALOG NUMBER	TOOL TYPE	COMPONENT*	PROVENIENCE	DATUM DEPTH	RAW MATERIAL	HEAT DIS-COLORATION	WEIGHT (g)	DIMENSIONS (mm) Length	Width	Thickness
55	Projectile Point	W	E87,N110	1.95	TWS		14.7	71	35	6
412	Projectile Point	W	E88,N110	1.96	TWS				34	7
119	Projectile Point	W	E100,N109	1.85	AR		6.5	53	24	7
268	Knife	W	E86,N109	1.99	BWS		22.2	40	33	20
273	Knife	W	E86,N109	1.99	BWS					7
292	Knife	W	E86,N109	2.06	BWS		24.1	72	44	10
427	Knife	W	E88,N110	2.12	BWS				33	8
56	Biface Scraper	W	E87,N110	1.99	BWS	+	17.7	50	37	9
57	Biface Scraper	W	E87,N110	1.99	BWS		32.8	53	50	13
318	Biface Scraper	W	E87,N109	1.97	BWS		17.7	45	44	11
409	Chopper	W	E88,N110	2.00	BWS				42	24
294	Biface Fragment	W	E87,N109	1.34-.64	BWS					8
129	Projectile Point	M	E103,N100	2.57	NLW				13	3
180	Projectile Point	M	E102,N99	2.64	BWS				11	3
191	Projectile Point	U	E102,N100	2.14	BWS				11	3
241	Projectile Point	M	E103,N100	2.59	BWS				12	4
104	Knife	M	E103,N100	2.79	TWS		58.5	95	41	13
113	Knife	M	E100,N100	2.98	TWS		31.9	78	37	11
141	Knife	U	E101,N100	1.90	BWS		14.1	60	22	10
157	Knife	M	E101,N100	2.6-2.7	SH		17.8	78	30	7
91	Blank	M			BWS	+	3.2	28	18	6
110	Blank	M	E100,N100	2.87	BWS		72.9	72	53	19
134	Blank	M	E101,N99	2.63	BWS	+	58.8	75	39	24
156	Blank	M	E101,N100	2.6-2.7	BWS		38.5	65	41	25
19	Projectile Point	U	Cut Bank		BWS		17.6	85	29	8
341	Knife	U	E100,N103	2.53	BWS		50.4	46	46	20

*WOODLAND (W), MISSISSIPPIAN (M), UNKNOWN (U)
**BWS = Blue Winterset, TWS = Tan Winterset, AR = Argentine, NLW = Non-Local White, SH = Spring Hill

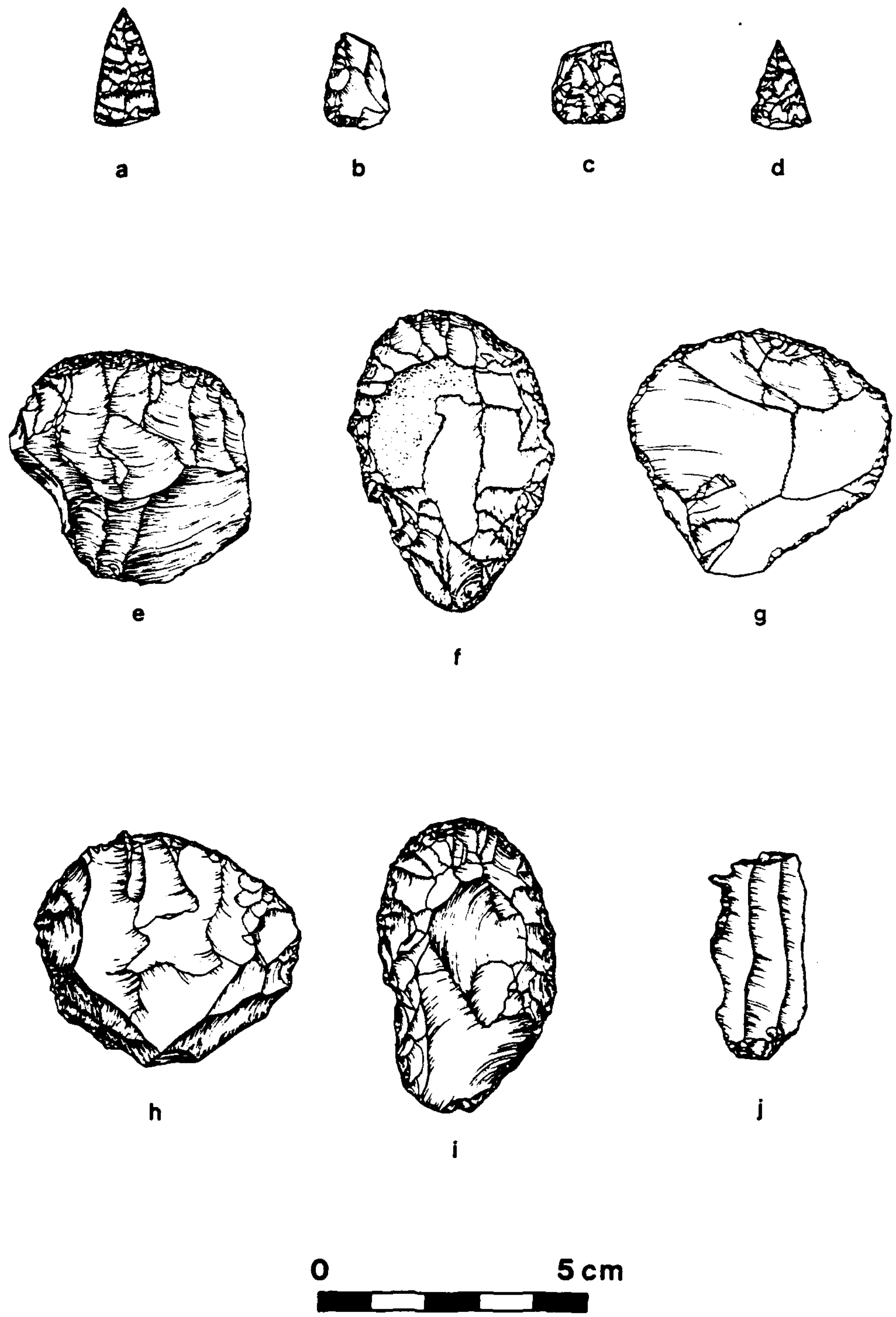

Figure 106. Chipped stone tools from 23JA238: (a-d) arrow points, (e-i) scrapers, (j) perforator.

is of Winterset and shows minimal working and only marginal retouching (Fig. 106c). Remnant cortex is present on the dorsal surface. These unnotched points are similar to those referred to as Mississippian Triangular (Chapman 1980:310). The other arrow point was fractured near the hafting element and was likely a side-notched point (Fig. 106a). This point is made from Winterset chert, shows complete bifacial pressure flaking, and has a thin lenticular cross-section. A fourth small arrow point was recovered from just above the May Brook deposits at a datum depth of 2.14 meters (Fig. 106d). This point is made from Winterset chert and is similar to the above specimens.

Three nearly complete points were recovered from the Woodland deposits. All are medium-sized, contracting stemmed dart points with lenticular cross-sections and slightly concave bases. Incurvate blades suggest resharpening and use of these implements as knives. The blade is slightly beveled on one specimen of tan Argentine chert (Fig. 107a) which appear to have been extensively resharpened. A second point is manufactured of Winterset chert (Fig. 107b). These points resemble Langtry points described by Chapman (1980:309). The final point at 23JA238 was found in the slump along the face of the cut bank (Fig. 107d). It is a large corner notched expanding stemmed dart point of Winterset chert. In the Kansas City area large corner notched points generally are associated with the Woodland period.

Bifacial Knives (n=9)

Three bifacial knives of Winterset chert were recovered from the May Brook component. One large subtriangular tan Winterset biface exhibits patterned primary flaking and unidirectional marginal retouch (Fig. 107e). A second large triangular tan Winterset specimen shows less patterned primary flaking and has an unfinished distal end (Fig. 107f). A lateral edge of this tool exhibits numerous step fractures. A third artifact is a medium-sized, slightly asymmetric lanceolate-shaped biface with an unfinished base make from Spring Hill chert (Fig. 107g). Patterned primary flaking and unidirectional marginal retouch are present. The cross-section is lenticular.

Four bifacial knives make from blue Winterset chert were recovered from the Woodland occupation. A complete ovate specimen has a lenticular cross-section and shows patterned primary flaking and unidirectional marginal retouch (Fig. 107h). A second complete knife is made from a small patinated Winterset stream pebble. This artifact has a sinuous working edge and unidirectional marginal retouch. The distal fragment of a large biface with unidirectional marginal retouch and a thin lenticular cross section appear to have been a knife. A final broken specimen (Fig. 107i) is a distal section of an alternately beveled knife with steep marginal retouch and numerous step fractures. Two final bifacial knives from 23JA238 include one from the upper deposit in Test Block A and a second from Test Unit I. The first is a medium-sized lanceolate artifact with intermittent attrition wear on the margins. The second is a section of a Winterset biface that exhibits a bifacially flaked edge with unidirectional marginal retouch and intermittent attrition wear.

Bifacial Scrapers (n=3)

Three complete circular bifaces from the Woodland occupation show primary utilization as scrapers (Fig. 106e). Primary flaking is patterned and bifacial. Secondary retouch is unidirectional and limited to the margins. Two of

Figure 107. Bifacial tools from 23JA238: (a-d) projectile points, (e-i) bifacial knives.

the specimens show retouching and step flaking nearly around their entire circumference. All are of Winterset chert and one has been heated.

Chopper (n=1)

A large Winterset cobble from the Woodland component has a bifacially worked edge. Step fracturing and edge battering indicate likely use as a heavy duty cutting and scraping implement.

Bifacial Blanks (n=4)

Four bifaces of Winterset chert from the May Brook component show a lack of marginal retouch or edge wear. All were probably early discards in the lithic reduction sequence. Two have been heated.

Biface Fragment (n=1)

A small bifacial edge fragment was recovered from the Woodland occupation. It is not sufficiently complete to indicate morphology or function.

Unifacial and Edge-Modified Tools

This includes unifacial tools whose original shape has been altered by marginal retouch along with flakes which show evidence of use modification. Descriptive data for unifacial and edge-modified flakes are presented in Tables 44 and 45.

Unifacial Scrapers (n=12)

Marginally retouched tools with a steeply retouched distal or lateral margin are referred to as scrapers. Three scrapers were recovered from the May Brook component. One Winterset end scraper has a steeply retouched distal end with scraper wear extending around a lateral margin. The other May Brook end scrapers are manufactured from a non-local white chert. A complete specimen shows scraping wear on the distal end with retouch on both lateral margins. One lateral margin has scraping wear and one cutting wear. This scraper and the Winterset scraper mentioned above could properly be classified as disto-lateral scrapers similar to those recovered from the May Brook site (Schmits 1980). The second specimen made from non-local white chert is a small distal fragment of a steeply retouched artifact. Numerous step fractures are evident.

Eight scrapers were recovered from the Woodland occupation. Five are ovate scrapers showing a steeply retouched distal end and retouch and step flaking around their entire margins (Fig. 106f-i). Secondary retouch covers much of the dorsal face on three of these five specimens. Three of the five are manufactured of Winterset chert, one of a non-local, heated oolitic chert, or agate, possibly derived from glacial till, and one of a non-local red and brown chert. Three additional scrapers from the Woodland component include one end scraper made from a large tabular Winterset flake. The distal end shows scraper utilization with knife wear extending around one lateral margin. A second is a broken side scraper of Winterset chert showing two steeply retouched lateral margins and numerous step fractures. A small fragment of a Winterset core also shows steep retouch and step flaking. Similar artifacts from the Langtry complex in the Fishing River drainage have been designated "scraping planes" by Martin (1976:18).

Table 44. Decriptive data for unifacial tools from 23JA238.

CATALOG NUMBER	TOOL TYPE	COMPONENT*	PROVENIENCE	DATUM DEPTH	RAW MATERIAL	HEAT DIS-COLORATION	WEIGHT (g)	DIMENSIONS (mm) Length	Width	Thickness
17	Scraper	W	E86,N110	1.91	NL	+	26.6	56	37	15
32	Scraper	W	E86,N110	2.06	BWS		11.9	54	33	13
33	Scraper	W	E86,N110	2.08	BWS					8
34	Scraper	W	E86,N110	2.07	BWS		40.4	49	44	23
159	Scraper	W	E101,N106	1.88	NL		12.9	40	35	15
270	Scraper	W	E86,N109	1.97	TWS		21.8	49	46	16
316	Scraper	W	E87,N109	2.00	BWS		61.9	67	46	29
410	Scraper	W	E88,N110	1.97	BWS		29.8	31	30	24
271	Perforator	W	E86,N109	1.93	BWS		2.9	39	18	4
314	Notch	W	E87,N109	1.97	BWS		73.8	57	55	31
76	Scraper	M	E100,N99	2.50-2.60	NLW		10.2	39	34	7
112	Scraper	M	E100,N100	2.89	BWS		10.1	44	24	11
215	Scraper	M	E103,N99	2.43	WHT		3.0			6
137	Knife	M	E101,N99	2.68	BWS		7.9	39	26	7.5
365	Scraper	U	E100,N107	1.78-1.98	BWS		6.8			9

*WOODLAND (W), MISSISSIPPIAN (M), UNKNOWN (U)
**BWS = Blue Winterset, TWS = Tan Winterset, NLW = Non-local white, NL = Non-local

Table 45. Descriptive data for edge-modified flakes from 23JA238.

CATALOG NUMBER	COMPONENT*	PROVENIENCE	DATUM DEPTH	MATERIAL TYPE**	RETOUCHED	EDGE SHAPE AND WEAR * Convex-Straight	Concave	Projection	WEIGHT	DIMENSIONS Length	Width	Thickness
4	W	E86,N110	1.59	Winterset		1A			5.7	31	29	8
8-1	W	E86,N110	1.63-1.83	Winterset		1S						5
11	W	E86,N110	1.68	Winterset	+		1A		2.8	42	21	5
12	W	E86,N110	1.76	Winterset		1A			5.6	34	24	10
13	W	E86,N110	1.70	Winterset		1A			1.7	27	21	4
18	W	E86,N110	1.96	Winterset		1A			2.1	31	23	4
19	W	E86,N110	2.00	Winterset				+	1.6	27	17	5
20	W	E86,N110	1.93	Winterset			1S		2.7	42	21	4
24-1	W	E86,N110	2.03-2.23	Winterset		1A						5
41-1	W	E87,N110	1.63-1.83	Winterset	+	1A	1S					3
45	W	E87,N110	1.72	Winterset		1A						5
58	W	E87,N110	1.95	Winterset		1A			3.0	29	24	7
59	W	E87,N110	1.93	Winterset		1S			4.9	40	25	7
60	W	E87,N110	1.86	Winterset			1S		7.5	43	35	6
61	W	E87,N110	1.93	Winterset		1A			1.1	26	17	3
67	W	E87,N110	2.05	Winterset			1A		8.3	45	25	7
117	W	E100,N109	1.77-1.97	Winterset			1S		17.1	52	35	15
160	W	E101,N109	1.97-2.17	NLW		1A			1.5	29	21	3
246	W	E86,N109	1.63	Winterset				+	0.7	30	11	3
255	W	E86,N109	1.70	Winterset		1A			5.0	35	30	6
257	W	E86,N109	1.72	Winterset		1S			0.7	26	16	3
260-3	W	E86,N109	1.84-2.04	Winterset		1A			1.4	33	20	3
264	W	E86,N109	1.85	Winterset	+	1S			0.5	17	14	3
266	W	E86,N109	1.98	Winterset		1A			1.7	30	21	4
272	W	E86,N109	1.96	Winterset		1A			2.2	47	19	3
277	W	E86,N109	1.94	Winterset		1A			1.1	30	15	4
279	W	E86,N109	1.92	Winterset			1S		3.5	39	27	5
285-1	W	E86,N109	2.04-2.24	Winterset		1S			4.6	35	34	7
285-2	W	E86,N109	2.04-2.24	Winterset		1A						6
286	W	E86,N109	2.16	Winterset	+	1A			0.3	17	9	2
287	W	E86,N109	2.05	Winterset		1A			1.5	33	25	3
288	W	E86,N109	2.07	Winterset		1A			2.9	35	22	6

Table 45. (Continued) Descriptive data for edge-modified flakes from 23JA238.

CATALOG NUMBER	COMPONENT*	PROVENIENCE	DATUM DEPTH	MATERIAL TYPE**	RETOUCHED	EDGE SHAPE AND WEAR *			WEIGHT	DIMENSIONS		
						Convex-Straight	Concave	Projection		Length	Width	Thickness
289	W	E86,N109	2.04	Winterset				+	1.5	27	26	3
290	W	E86,N109	2.05	Winterset		1A						4
295	W	E87,N109	1.34-1.64	Winterset				+	3.0	29	25	5
305	W	E87,N109	1.71	Winterset		1S	1S		3.3	36	24	4
416	W	E88,N110	2.01	Winterset		1A			2.2	42	14	4
86	M	E100,N100	2.25	Winterset	+		1S	+	5.5	30	24	12
111	M	E100,N100	2.89	Winterset	+	1S			7.9	32	31	9
122	M	E101,N99	2.28-2.38	Winterset		1S			2.6	37	23	3
145	M	E101,N100	2.20-2.30	Winterset		1A			1.7	20	18	4
149	M	E101,N100	2.32	Winterset		2A			2.0	34	19	3
234	M	E103,N100	2.57	Winterset		1A			2.7	38	18	5
237	M	E103,N100	2.61	Winterset		1S			6.1	36	23	9
326	U	E100,N102	2.00-2.20	Winterset		1S	1S		6.8	35	28	9
335-2	U	E100,N103	1.50-1.80	Winterset		1A			0.8	20	15	3
336	U	E100,N103	1.50-1.80	Winterset		1S			3.0	25	24	7
340	U	E100,N103	2.40-2.60	Winterset		1A			6.8	43	23	9
353	U	E100,N106	1.98-2.18	NL		1A			1.1	22	16	3
367	U	E100,N107	1.80	NLW		1A			3.0	30	17	6
368	U	E100,N107	1.85	Winterset		1S			15.5	54	35	15
373	U	E100,N107	1.98-2.18	Winterset			1S		6.6	58	19	11
430	U	Cut bank		Winterset		1A	1S		2.9	37	16	5

*WOODLAND (W), MISSISSIPPIAN (M), UNKNOWN (U)
**NLW = Non-local white, NL = Non-local

The cultural affiliation of one additional end scraper, recovered from Test Unit 2 and is unknown. It is a distal section that exhibits steep marginal retouch and step flaking and is manufactured of Winterset chert.

Flake Knife (n=1)

One unifacial artifact from the May Brook phase occupation exhibits retouch and attrition along a lateral edge. The other margin shows attritional wear but lacks retouch. It is manufactured from Winterset chert.

Notch (n=1)

A core fragment of Winterset chert from the Woodland component has a steeply retouched concave working edge. Step flaking and edge crushing occur. The notch width is 17 cm.

Perforator (n=1)

A Winterset bladelet is retouched on opposite faces of a lateral margin forming projection suitable for perforating (Fig. 106j). It was recovered from the Woodland occupation.

Edge-Modified Flakes (n=53)

These tools have use modified or marginally retouched edges with little alteration of the original shape of the flake. Descriptive data for edge-modified flakes is presented in Table 45 below. Fifty-one of the edge-modified flakes are made from blue Winterset. Two are of non-local white chert. Seven edge-modified flakes were recovered from the May Brook component. Attritional wear indicative of cutting use is present on four. Step flaking is present on three flakes indicating likely use in scraping tasks. Thirty-six specimens are of Winterset chert, and one is of a non-local heat treated white chert. Four show deliberate marginal retouch. Twenty-three flakes (47.4 percent) exhibit attritional wear indicative of cutting use. Twelve (33 percent) show step flaking indicative of scraping use. Four artifacts (11 percent) have projections suitable for perforating or engraving. Eight edge-modified flakes were recovered from Test Units 1 and 2 and cannot be definitely associated with either component. An additional edge-modified flake was recovered from the slump along the cut bank.

Cores and Manufacturing Debris

The lithic manufacturing debris from 23JA238 consists of cores, chunks, shatter, debitage, and chips.

Cores (n=4)

One core was recovered from the May Brook component, two from the Woodland, and one from a test pit of undetermined affiliation. Descriptive data for cores is presented in Table 46. Irregular platforms and non-patterned flake removal surfaces are present on all cores. All cores are Winterset chert.

Chunks (n=34)

Irregular chipping debris with a maximum dimension of more than 3 cm and lacking recognizable striking platforms and flake removal surfaces have been classified as chunks. Ten chunks were recovered from the May Brook component,

Table 46. Descriptive data for cores from 23JA238.

CATALOG NUMBER	COMPONENT*	PROVENIENCE	DATUM DEPTH	MATERIAL TYPE	CORTEX PRESENT Absent	<50%	>50%	WEIGHT (g)	DIMENSIONS (mm) Length	Width	Thickness
202	M	E102,N100	2.58	Winterset	+			59.5	66	56	20
313	W	E87,N109	1.93	Winterset	+			76.1	58	58	26
315	W	E87,N109	1.96	Winterset	+			136.4	69	55	32
366	U	E100,N107	1.78-1.98	Winterset	+			88.8	77	43	32

*WOODLAND (W), MISSISSIPPIAN (M), UNKNOWN (U)

21 from the Woodland component, and three from a test pit of undetermined cultural affiliation. All chunks from 23JA238 are of Winterset chert.

Shatter (n=30)

Irregular pieces of raw material with a maximum dimension of less than 3 cm has been classified as shatter. Five pieces of shatter are from the May Brook component, 23 from the Woodland occupation, and two of an undetermined affiliation. All shatter from 23JA238 appear to be of Winterset chert.

Debitage (n=331)

Debitage consists of non-utilized flake or flake fragments with a maximum dimension of greater than 2 cm. Twenty-eight flakes were recovered from the May Brook component, 275 from the Woodland occupation and 28 from deposits of undetermined affiliation. Over 90 percent of the flakes recovered are tertiary flakes, indicating that the final stages of lithic reduction took place at the site. Most appear to be of Winterset chert.

Chips (n=498)

Chips consist of small flakes with a maximum dimension of less than 2 cm. Thirty-eight chips were recovered from the May Brook occupation, 431 from the Woodland component, and 29 were of undetermined cultural affiliation. Most appear to be of Winterset chert.

Other Classes of Debris

Other classes of debris recovered from the May Brook component include one fire-reddened limestone cobble probably used as a hearthstone, nine pieces of unworked limestone, and three historic artifacts. The historic artifacts are two metal screws and a small brass tag. All three were located in Test Block A above the May Brook deposits. Additional artifacts recovered from the Woodland component include one small tabular chunk of hematite, 47 fire reddened limestone cobbles, and twelve pieces of unworked limestone. Four fire reddened limestone cobbles, a small piece of hematite, and fifteen pieces of unworked and unreddened limestone were recovered from test pits of unknown cultural affiliation.

Faunal Remains

Faunal remains from 23JA239 were well preserved but were limited in number. Ten fragments of unidentifiable bone were recovered from the May Brook component. Thirteen fragments, including an *Odocoileus* sp. (deer) metapodial and a sesamoid, were recovered from the Woodland component. Seven fragments of unworked bone including a section of a deer mandible were recovered from test pit levels of unknown cultural affiliations.

Floral Remains

The floral assemblage recovered from 23JA238 includes charcoal, carbonized nut fragments, and carbonized and uncarbonized modern intrusive seeds. Charcoal and some of the carbonized nut shell fragments were recovered from

the general excavation. The carbonized seeds were recovered from flotation samples. Distribution of the carbonized nuts and the seeds is presented in Table 47. The following discussion summarizes information concerning the habitat, season of availability and known ethnographic uses of the carbonized plant species recovered.

Carbonized seeds

The carbonized seeds from 23JA238 include 39 specimens representing five species (Table 47). All carbonized seeds were recovered from flotation samples.

Ammannia sp. (ammannia) n=9

Eight carbonized ammannia seeds were recovered from the Woodland component, one from the May Brook component. Ammannia is a small annual plant, 20-25 cm tall, which produces small capsules of seeds according to Steyermark (1963: 1089). *A. auriculata* (ammannia) and *A. coccines* (tooth cup) occur in Missouri. The latter is by far the most common and widespread. It is found on muddy margins of slow streams, ponds, and sloughs. Each plant produces hundreds of seeds which are available in late August through October and can be easily collected by gathering the plants before the capsules breaks. The seeds are light and can be blown on the ground or washed about rains or flooding.

Chenopodium hybridium (maple leaf goosefoot) n=5

The goosefoot seeds were recovered from the Woodland component. Mapleleaf goosefoot occurs on rich, open soils, woodlands, along shaded ledges, and on slopes and bluffs (Steyermark 1963:611). Chenopods are annual plants, 60-100 cm in height, that produce thousands of seeds per plant. Seeds are available from September through October.

There is widespread ethnographic documentation on the aboriginal use of *Chenopodium.* The Report of the U.S. Commissioner of Agriculture for the 1870 (1871:419) states:

> "The young tender plants are collected by the Navahos, the Pueblo Indians of New Mexico, all the tribes of Arizona, the Diggers of California, and the Utahs and boiled as herbs along or with other food. Large quantities are also eaten in the raw state. The seeds of this plant are gathered by many tribes, ground into flour after drying and made into bread or mush. The flour....resembles buckwheat in color and taste and is regarded as equally nutritious."

According to Fewkes (1897) the Hopi ate leaves of *C. album* boiled with fat. *C. cornutum* seeds were ground and mixed with corn to make dumplings. Smith (1933:98) comments on the use of leaves by Pottawatomi to prevent or cure scurvy. The Zunis and Navahos used *Chenopodium* sp. seeds (Standley 1912:458).

Portulaca mundula (johnson purslane) n=12

Two carbonized purslane seeds were recovered from the May Brook component, and ten from test pits of undetermined affiliation. Purslane is a short mat-forming plant 5-13 cm in height. *Portulaca mundula* occurs on sand-

Table 47. Carbonized seeds from 23JA238.

	WOODLAND					MAYBROOK						UNKNOWN					
	0 – 30	30 – 50	50 – 70	70 – 90	TOTAL	2.4 – 2.5	2.5 – 2.6	2.6 – 2.7	2.7 – 2.8	2.8 – 2.9	TOTAL	2.0 – 2.1	2.1 – 2.2	2.2 – 2.3	2.3 – 2.4	TOTAL	SITE TOTAL
<u>Ammannia</u> sp. ammannia			8		8					1	1						9
<u>Chenopodium hybridum</u> maple-leaf goosefoot			5		5												10
<u>Portulaca mundula</u> johnson's purslane									2		2				10	10	12
<u>Smilax</u> sp. green briar							1				1						2
<u>Viloa</u> sp. violet															3	3	3
Unidentified			2	1	3												3
Total			15	1	16		1		2	1	4				13	13	39

stone chert, and limestone glades and edges of rocky exposed bluffs and escarpments (Steyermark 1963:634). Each plant produces several hundred or more seeds available from August through October.

Sturtevant (1919:450) reports that P. lutea (yellow purslane) was used as a vegetable in the Society Islands and in New Zealand. P. oleracea (purslane) was used as a vegetable in many areas of the world. P. retusa which is present in western North America was eaten by the Apache. Standley (1911:458) cites the use of P. oleracea and P. retusa seeds by the Zunis and Navahos. Palmer (1978: 602) also states that the Piute used P. oleracea seeds.

Simlax sp. (greenbriar) n=1
One carbonized greenbriar seed was recovered from the May Brook component. Greenbriar is a woody vine common in western Missouri. Two species are represented Jackson County. S. herbacea is found in rich or rocky woods (Steyermark 1963:452) and S. tamnoides occurs in low woods in valleys, along banks of streams, and on rich wooded slopes (Steyermark 1963:452). The fruits, produced in small clumps, ripen in the fall but are available green earlier. The availability of the fruits would range from July to October. The seeds are dispersed by animals and birds. S. herbacea seeds were eaten by the Omaha and thought to relieve hoarseness (Gilmore 1919:71).

Viola sp. (violet) n=3
Three carbonized violet seeds were recovered from test units with undetermined cultural affiliation. Violets are small plants 10-15 cm in height which may occur in large patches. Eight species are represented in the Kansas City area (Steyermark 1963:1069-1081). V. missouriensis, V. papilionacea, V. pensylvanica, V. sororia, V. striata, and V. viarum are mesic adapted species that occur along stream margins and low alluvial soils. V. bernardi and V. triloba prefer rocky open woods, dry open ridges, and prairies.

Carbonized Nuts

Most carbonized nuts from 23JA238 were recovered from flotation samples. The sample includes 119 fragments, 77 of which were identifiable (Table 48). The majority of the nuts are small fragments. Five taxa including acorns (Quercus sp.), bitternut hickory (C. cordiformis), mockernut hickory (C. tomentosa), shagbark hickory (C. ovata), and black walnut (Juglans nigra) were recovered. Nine fragments are from the May Brook component, 110 are from the Woodland component.

Quercus sp. (acorn) n=2
Two acorn shell fragments were recovered from the Woodland component. According to Steyermark (1963:532-550) nine species of oak are present in Jackson County, Missouri. Q. stellata (post oak), Quercus prinoides (chestnut oak), Q. imbricaria (shingle oak), Q. marilandica (Black Jack oak), Q. shumardii (Shummard oak) and Q. velutina (black oak) are xeric-adapted species found on rocky uplands and in thin shallow soils along bluffs and valley walls. Q. macrocarpa (bur oak), Q. bicolor (swamp white oak), Q. imbricaria (shingle oak), Q. palustris (pin oak), and Q. borealis (red oak) are present in alluvial soils along valleys and along streams. Acorns are principally available in October, although a few species such as Q. prinoides and Q. imbricaria are available in September (Stephens 1973:108-128).

Table 48. Carbonized nuts recovered from 23JA238.

	WOODLAND					MAYBROOK						UNKNOWN					
	0 - 30	30 - 50	50 - 70	70 - 90	TOTAL	2.4 - 2.5	2.5 - 2.6	2.6 - 2.7	2.7 - 2.8	2.8 - 2.9	TOTAL	2.0 - 2.1	2.1 - 2.2	2.2 - 2.3	2.3 - 2.4	TOTAL	SITE TOTAL
<u>Quercus</u> sp. acorn			2		2												2
<u>Juglans</u> <u>nigra</u> black walnut			3		3												3
<u>Carya</u> <u>cordiformis</u> bitternut hickory			36	2	38		2				2						40
<u>Carya</u> <u>tomentosa</u> mockernut hickory			6		6												6
<u>Carya</u> <u>ovata</u> shagbark hickory			22		22		4				4						26
Unidentifiable Frag.			36	3	39		3				3						42
Total			105	5	110		9				9						119

Acorns were widely used for food in many parts of aboriginal North America (Yanovsky 1936:18-19). In the Plains their use among the Pawnee is recorded by Gilmore (1919:75). Acorns, in the natural state, contain large amounts of tannin and are not suitable for human consumption. A description of methods used by the Menomini to remove the tannin is provided by Smith (1923:66)

> "The acorns were boiled until almost cooked. The water thrown out, fresh water and two cups of wood ashes were added. The acorns were then put back into a pot and boiled in the lye water. They were pulled from the boiling water and simmered in fresh water to clear them of lye. The acorns were then ground into meal with a mortar and pestle and then sifted through a birch-bark sifter."

Juglans nigra (black walnut) n=3

Three fragments of black walnut shell were recovered from the Woodland component. This species occurs in rich woods at the base of slopes or bluffs, in valleys along streams, and in open and upland woods (Steyermark 1963:510). The nuts are available in October (Stephens 1973:76). According to Yanovsky (1936:17), black walnuts were commonly eaten in aboriginal North America.

Carya cordiformus (Bitternut Hickory) n=40

Thirty-eight fragments of bitternut hickory were recovered from the Woodland component, and two from the May Brook component. Bitternut hickory occurs on rich and alluvial soils, and nuts are available in October (Stephens 1973:78). Hickory nuts were eaten widely throughout aboriginal North America (Yanovsky 1936:16-17). In many instances they were a very important resource, intensively gathered in the fall and stored for winter use.

Carya tomentosa (Mockernut Hickory) n=6

Six fragments were recovered from the Woodland component. Mockernut hickory occurs mostly in dry upland woods on high ridges or slopes (Steyermark 1963:518). The nuts are available in October (Stephens 1973:88).

Carya ovata (Shagbark Hickory) n=26

Twenty-two fragments were recovered from the Woodland component and four from the May Brook deposits. Shagbark hickory is found in lowland and upland woods. Nuts from this species are available in September and October (Stephens 1973:84).

DISCUSSION AND RECOMMENDATIONS

Phase II test investigations at 23JA238 indicate the presence of two cultural components located in the T-1 terrace fill of the Little Blue River. The stratigraphy at the site consists of a recent alluvial fill (Unit B) cut into the T-1 terrace of the Little Blue River (Unit A). The first component, encountered in Test Block A, consists of a thick, concentrated midden dating to the Mississippian period and radiocarbon dated at A.D. 1270. Stratigraphically, this component is located from 90-150 cm below the surface at the top of Unit A and in the lower deposit of Unit B. The second component dates to

the earlier Woodland periods and is located near the surface of Test Block B in the upper deposits of Unit A. The Woodland component consists of a stratum concentrated at 30-90 cm below the surface of Unit A. A radiocarbon date of A.D. 330 has been obtained from the Woodland component at 23JA238.

Diagnostic artifacts from the Mississippian component are similar to artifacts recovered from several recently excavated sites in the Little Blue drainage which have been assigned to the May Brook phase (Brown 1979; Schmits 1980). Small notched and unnotched arrow points and cord marked sherd and shell tempered ceramics are characteristic of the May Brook site (Schmits 1980) and the Seven Acres site (Brown 1979). North of the Missouri River small arrow points are typical of the Steed-Kisker phase, but ceramics of that phase are characterized by a smooth surfaced shell tempered type referred to as Platte Valley Plain (Chapman 1980:292). To the west in Kansas ceramics and arrow points similar to the May Brook component are reported from Pomona focus Plains Village Tradition sites such as Dead Hickory Tree (Witty 1978; Schmits, et al. 1980).

Artifacts from the Woodland component included sand tempered ceramics and contracting stemmed dart points. Sand and grit tempered pottery are generally associated with Woodland period sites in the Kansas City area. Artifacts from the late Middle Woodland component at the Sohn site (Reeder 1978:219) include plain surfaced sand tempered ceramics, but the excavated projectile points are exclusively expanding stemmed typed. The Langtry complex from the Fishing River drainage is typified by cord roughened sand tempered ceramics, contracting stemmed Langtry dart points, and numerous scrapers (Martin 1976: 18). Although the Langtry complex has not been radiocarbon dated it has been assigned to the Late Archaic/ Early Woodland period by Martin (1976:18). The date of A.D. 330±45 from 23JA238 would indicate that the contracting stemmed Langtry points extend into the Middle Woodland period.

Table 49 presents the frequencies of various tool categories recovered from 23JA238 and the inferred activities associated with each. Tools associated with cutting activities predominate in the May Brook component. Light duty cutting tools as indicated by utilized flakes and the flake knife comprise 29.4 percent of the assemblage, while heavy duty cutting tools as indicated by bifacial knives comprise 17.6 percent. Scrapers and utilized flakes with scraping wear comprise 35.3 percent of the tools. Hunting is indicated by four arrow points (17.6 percent). No implements designed for plant food processing (manos, metates) were recovered.

Cutting and scraping implements are about equally represented in the Woodland component. Cutting activities were represented by light cutting tools (38.3 percent) and heavy cutting implements (8.3 percent). Scraping activities are represented by 24 tools (40 percent), including three bifacial scrapers, eight unifacial scrapers, a notch, and 12 utilized flakes with scraping wear. Tools suitable for perforating comprise 8.3 percent of the assemblage. Hunting activity is represented by two dart points (5.0 percent). No artifacts suitable for use in plant food processing were recovered.

The lithic assemblage from 23JA238 indicates that the Middle Woodland and May Brook occupants of the site predominantly relied on the local blue gray

Table 49. Frequency of inferred activities from lithic tools from 23JA238.

INFERRED ACTIVITY	Projectile Points	Bifacial Knives	Bifacial Chopper	Bifacial Scraper	Unifacial Scraper	Perforator	Notch	Flake Knife	Edge-Modified Flake	TOTAL	PERCENT OF TOTAL
WOODLAND COMPONENT											
Scraping				3	8		1		12	24	40.0
Light Duty Cutting									23	23	38.3
Heavy Duty Cutting		4	1							5	8.3
Perforating						1			4	5	8.3
Hunting	3									2	5.0
Total	3	4	1	3	8	1	1		39	60	99.9
MAY BROOK COMPONENT											
Scraping					3				3	6	35.3
Light Duty Cutting								1	4	5	29.4
Hunting	3									3	17.6
Heavy Duty Cutting		3								3	17.6
Total	3	3			3			1	7	17	99.9

Winterset chert for the manufacture of chipped stone tools. However, non-local cherts are present, especially in the May Brook component. Twenty of the 22 artifacts from the Woodland component (91 percent) are made from local blue and tan Winterset or Argentine cherts. Only two artifacts are made from non-local cherts. In contrast four of the 14 (28 percent) May Brook artifacts are made from non-local cherts. Included is one artifact made from Spring Hill chert and three made from non-local white cherts. The white cherts appear to be similar to those from Mississippian system formations. The closest outcrops of these cherts are in central and south central Missouri.

The limited number of cores, chunks and debitage recovered from the site along with the fact that the manufacture of chipped stone tools was not a major activity that occurred at the site. This is supported by the fact that much of the debitage consists of tertiary reduction flakes and small resharpening flakes.

The limited faunal remains from the site indicate exploitation of local deer populations during the Woodland occupation. More direct evidence concerning the subsistence can be inferred from the floral remains. Based on identifiable flora, hickory nuts are the dominant plant food utilized at 23JA238. Ninety-three percent of the identifiable nut fragments from the Woodland component and 100 percent from the May Brook excavation are hickory nuts. The carbonized flora recovered represent plant species readily available in the site vicinity. Nuts are obtainable from the flood plain forest or upland slopes to the north and south of 23JA238. Ammannia, mapleleaf, goosefoot, and violet seeds are commonly found in flood plain forests along streams. Greenbriar and johnson purslane are especially common to rocky hillsides.

In summary both components at 23JA238 appear to represent short-term extractive sites where the butchering and processing of game and vegetal resources took place. The available plant remains suggest a fall season of occupancy for the Woodland occupation. Insufficient evidence for the determination of the season of occupancy is available from the May Brook component. However, the location of the site in a depressional flood plain environment is suggestive of a dry season (summer through winter) occupation.

RECOMMENDATIONS

23JA238 is a significant site which as part of the Blue Springs Lake Archaeological District has been determined eligible for the National Register of Historic Places. Testing has demonstrated that the site contains buried deposits of two virtually unknown cultural complexes in the Little Blue River drainage. The preservation of intact cultural features and a thick buried deposit of cultural remains indicates that the site contains data which will answer important questions concerning Woodland and Mississippian period chronology and adaptive patterns. The site presently is being destroyed by slumping and erosion from the north cutting meander of the Little Blue River. The site will be inundated by the filling of Blue Springs Lake and will likely be damaged by wave action as the lake is filled. Appropriate mitigative action should be taken. Under the circumstances this would likely consist of extensive data recovery.